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The genus *Astragalus* (Leguminosae: Papilionoideae: Galegeae) in Mexico

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Abstract

Astragalus is the most diverse genus within flowering plants with almost 2500 species, it is widely distributed around the world, very abundant in temperate regions of the Northern Hemisphere, in central and western Asia, Turkey, Iran, and Afghanistan, central Asia, Europe, Mongolia, Siberia, northeastern China, and Japan. In the American continent it is especially abundant in Canada, western United States, Mexico, and South America. Given the diversity of *Astragalus* species present in Mexico, the recent description of at least 15 new species for this country, the absence of a recent study that encompasses all the new findings and that the last general study for Mexico dates back almost 60 years, we consider necessary a new taxonomic synopsis that encompasses all the new information, which is presented here. The study records 102 species of *Astragalus* in Mexico. This work is based essentially on the review of collections of specimen samples, type specimens in national and foreign herbaria, data bases, and the collection of specimens of this genus by the authors in the last 40 years and that covers practically the entire area where this genus is distributed in Mexico. In this study we recorded 102 species and 46 infraspecific taxa; seventy one species and 17 varieties are endemic to Mexico. Baja California (32), Chihuahua (25), Durango (23), Sonora (22), Coahuila (20), San Luis Potosí (17), Nuevo León (17), and Zacatecas (15) are the states with the greatest species richness. In Mexico, the diversity of *Astragalus* species decreases from north to south and from west to east. Most of the species of *Astragalus* in Mexico are distributed in the mountains, followed by low and arid plains, including coastal dunes, those last ones, exclusively of the northwestern region. There are no records of any *Astragalus* species in Campeche, Tabasco, Quintana Roo or Yucatan. The dichotomous keys are based mainly on the color of flowers, the shape of the pod and if the fruit is sessile or stipitate. For each species is included also a morphological description, habitat, altitudinal range, and distribution map.

Keywords: Fabaceae, Galegeae, *Astragalus,* Mexico, taxonomy

Resumen

Astragalus es el género más diverso dentro de las plantas con flores con casi 2500 especies, está ampliamente distribuido en todo el mundo, muy abundante en regiones templadas del hemisferio norte, en Asia central y occidental, Turquía, Irán y Afganistán, Asia central, Europa, Mongolia, Siberia, noreste de China y Japón. En el continente americano es especialmente abundante en Canadá, oeste de Estados Unidos, México y Sudamérica. Dada la diversidad de especies de *Astragalus* presentes en México, la descripción reciente de al menos 15 nuevas especies para este país, la ausencia de un estudio reciente que englobe todos los nuevos hallazgos y que el último estudio general para México data de hace casi 60 años, consideramos necesaria una nueva sinopsis taxonómica que englobe toda la nueva información, que aquí se presenta. Este trabajo se basa fundamentalmente en la revisión de colecciones de ejemplares, especímenes tipo en herbarios nacionales y extranjeros, bases de datos y la colección de ejemplares de este género por parte de los autores en los últimos 40 años y que abarca prácticamente toda la zona donde esta género se distribuye en México. En este estudio registramos 102 especies y 46 taxones infraespecíficos; setenta y un especies y 17 variedades son endémicas de México. Baja California (32), Chihuahua (25), Durango (23), Sonora (22), Coahuila (20), San Luis Potosí (17), Nuevo León (17) y Zacatecas (15) son los estados con mayor riqueza de especies. En México, la diversidad de especies de *Astragalus* disminuye de norte a sur y de oeste a este. La mayoría de las especies de *Astragalus* en México se distribuyen en las montañas, seguidas por las llanuras bajas y áridas, incluidas las dunas costeras, estas últimas, exclusivamente de la región noroeste. No hay registros de especie de *Astragalus* en Campeche, Tabasco Quintana Roo ni Yucatán. Las claves dicotómicas se basan principalmente en el color de flores, forma de la vaina y si el fruto es sésil o estipitado. Para cada especie se incluye también una descripción morfológica, hábitat, rango altitudinal y mapa de distribución.

Palabras clave: Fabaceae, Galegeae, *Astragalus,* Mexico, taxonomy

Introduction

The genus name *Astragalus* L. (1753: 755) is apparently derived from the Greek word *astragalos* meaning ankle bone or talus, the bone located on the back of the foot that joins leg and foot and when joining with the tibia and fibula, it constitutes the ankle joint which allows moving the ankle up and down. Likely the shape of the seeds of some *Astragalus* species resemble this small bone. Historically, the word was used as a synonym for dice because the sound of the seeds inside the dried pods resembled the sound made by the dice of the goblet game (Barneby, 1964). *Astragalus* L. (Fabaceae; Papilionoideae; Galegeae; Coluteinae) is the most diverse genus within Fabaceae (Barneby 1989) and among flowering plants (Lock & Simpson 1991, Zarre & Azani 2013) comprising approximately 2,300 (Lock & Schrire 2005) to 2,500 (Lewis *et al.* 2005), or even 2,900 species (Zarre & Azani 2013) classified in almost 245 sections and found around the world (Lewis *et al.* 2005). Its distribution is more abundant in temperate regions (Polhill 1981) of the Northern Hemisphere, especially in central and western Asia, including 2500 species of *Astragalus* in the Old World (Lnag-rang & Podlech 2010), southwestern portion in Turkey, Iran, and Afghanistan (approx. 1500 species), central Asia, Europe, Mongolia, Siberia, northeastern China, and Japan (approx. 620 species), North America with 401 species (221 endemic) in 59 sections (Lnag-rang & Podlech 2010), Mexico (102 species and 47 infraspecific categories), and South America (100 species) (Barneby 1989, Lewis & Shrire 2003). The extraordinary speciation of *Astragalus* is evident in vegetative and fruit structures (Kazempour *et al.* 2003), but the polymorphism of its species is incomparable with almost any other genus of the eudicots. Since the nineteenth century, specialists of *Astragalus* in both, the Old and the New World, responsible for classifying and recognizing their specific entities, have opted for one of two different routes in order to better understand the morphological and anatomical diversity of the genus; one route, the segregation of one to several species into groups and a the same time, including them in one or more segregated genera from *Astragalus* (De Candolle 1802, Rydberg 1929, Podlech 1983) or the other route by maintaing the genus as such as a whole, but subdividing it into subgenera, sections or even subsections (Torrey & Gray 1838, Gray 1864, Bunge 1868, Taubert 1894, Jones 1923, Barneby 1964, Goncharov *et al.* 1965, Gómez Sosa 1979, Sanderson 1991, Maassoumi 1998, Isely 1998). However, despite its varied polymorphism, recent molecular studies support the monophyly of the genus *Astragalus* (Wojciechowski *et al.* 1993, Liston & Wheeler 1994, Sanderson & Liston 1995, Lavin & Marriot 1997, Wojciechowski *et al.* 1999) except for few outlier species (Chaudhary *et al.* 2008) which in turn has been elevated to generic rank with the help of various morphological features (Kazempour *et al.* 2005). Cytogenetically, the *Astragalus* sections of the New World (Neo-*Astragalus*) have a base number of n = 11 chromosomes (Barneby 1964)—15 Wojciechowski *et al.* 1999), while Old World species ("Old-*Astragalus*") have a euploid base number n = 8 (Barneby 1964)—16–32 (Sanderson & Liston 1995, Sanderson & Wojciechowski 1996, Wojciechowski *et al.* 1999, Kazempour *et al.* 2005).

For North America, including Mexico and Guatemala, *Astragalus* (Neo-*Astragalus*) consists of 93 sections, 368 species, and 184 infra specific categories (Barneby 1964). However, in the last four decades, at least 11 new species as been discovered for Mexico (Barneby 1976, Villarreal & Carranza 1994, Estrada *et al.* 2005, Rzedowski 2015, Estrada *et al.* 2016, Estrada *et al.* 2019, Estrada *et al.* 2022). In Mexico, the knowledge of this genus is based mainly on Barneby´s monographic work (1964), but also from regional floristic studies from the southern (Rzedowski 2010, McVaugh 1987) and northern regions (Shreve & Wiggins 1964, Wiggins 1980, Correll & Johnston 1970, Spellenberg *et al.* 1996, Henrickson & Johnston 1997, Villarreal 2001, Estrada *et al.* 2010, Estrada *et al.* 2014, Rebman *et al.* 2016,), and from global studies focusing on legume phytogeography and diversity (Sousa & Delgado 1998). The most recent eleven new species of *Astragalus* discovered in Mexico are characterstically isolated species with highly restricted distributions, and in most of these cases, only consists of the type locality. In the last 58 years there has not been a taxonomic review of *Astragalus* for all of Mexico, but more areas of the country have been explored, and more specimens have been collected and deposited in national and international herbaria. Thus, it was time put together a taxonomic contribution that compiles newer data on the diversity and distribution of *Astragalus* species in Mexico as presented here.

Importance of the species

Locoweeds are those species of *Astragalus* which contain swainsonine (the "loco" toxin) which induces neurological dysfunction or "locoism" (Panter *et al.* 2012) in some organisms that ingest them. These species are distributed almost throughout the planet. Out of almost 390 species of *Astragalus* occuring from Canada to Central America many of them contains nitro-toxins. At least 263 species in this region have been reported as contanining nitro-toxins (Williams

& Barneby 1977), and of these, 42 species reach Mexico (Table 1). *Astragalus racemosus* Pursh (1813: 740) is also frequently associated with selenium poisoning. In North America, *Astragalus* is usually listed among all the poisonous plants, and it is one of which causes the highest quantitative looses in the livestock industry (Graham *et al.* 2009). In Mexico, *Astragalus mollissimus* Torr. (1827: 178–179) is one of the most important toxic plants in grasslands of the Chihuahuan Desert (Melgoza *et al.* 2002). *Astragalus punae* I. M. Johnston (1947: 389) has been reported as a toxic species for llamas (Camelidae) in South America (Marin *et al.* 2022). Those species of *Astragalus* containing nitro-toxins kill or permanently cripple thousands of sheep and cattle annually (Williams & Baneby 1977) and therefore have a serious economic impact on the livestock industry. Medically, species of *Astragalus*, combined with other plants are used to stimulate the immune system (Dasgupta 2019). In the USA people use *Astragalus membranaceus* Moench (1794: 168) as an herbal supplement in order to stimulate immune systems to prevent cold and respiratory infections (Dasgupta 2019). Some species of *Astragalus* have been used against human colon cancer and human hepatocellular carcinoma cells (Liu *et al.* 2003). The roots of *A. membranaceus* have been used for almost 2000 years in the traditional Chinese medicine (Wang *et al.* 2019) as this species has bioactive polysaccharides used in pharmacology as antitumor, antioxidant, anti-aging, immunomodulation, cardiovascular protection, anti-inflammatory, and antiviral. It is known that mucilages present in *Astragalus* have some ecological functions by increasing water holding capacity for improved survival under desert conditions (Ebrahimzadeh *et al.* 2000). *Astragalus sinicus* L. (1767: 103) is used as green manure, improving soil fertility in rice farming systems in China (Shahrajabian *et al.* 2019). Undoubtedly the most used part of *Astragalus* all around the world is the gum tragacanth obtained from almost 30 species mainly from Iran (Amiri *et al.* 2020) that is used as food additive (Anderson 1989). This product is economically lucrative and is used in the preparation of different kinds of salad dressings, sweet pickle liquors, ice cream, beverage and bakery emulsions, sauces, relishes, condiments, jellied products such as gefilte fish, thick broths, and sherbets, bakery toppings and fillings and confectionary (Whistler 1993). Several species of *Astragalus* were used by North American indigenous groups. The chewed root of *A. americanus* (Hook.) M.E. Jones (1898: 8) were used to control stomach pain and flu (Dexter *et al.* 2014). The roots of of *A. canadensis* L. (1753: 757) were eaten raw or boiled in blood to prepare a broth that was used as analgesic in Canada (Dexter *et al.* 2014). Also, the chewed roots of *A. amphioxys* A. Gray (1878: 366) was applied topically against rattlesnake bites (Camazine & Bye 1980).

TABLE 1. Species and infraspecific categories of *Astragalus* recorded in México.

1.	*Astragalus acutirostris* S. Watson in *Proc. Amer. Acad. Arts* 20: 360–361. 1885.
2.	*A. allochrous* A. Gray, *Proc. Amer. Acad. Arts* 13: 366. 1878.
3.	*A. amphioxys* A. Gray *Proc. Amer. Acad. Arts* 3: 366. 1878.
4.	*A. anemophilus* Greene, *Bull. Calif. Acad. Sci*. 1: 186. 1885.
5.	*A. aridus* A. Gray, *Proc. Amer. Acad. Arts* 6: 223. 1864.
6.	*A. arizonicus* A. Gray, *Proc. Amer. Acad. Arts* 7: 398. 1868.
7.	*A. brauntonii* Parish var. *lativexilum* A. E. Estrada, Rebman, C. González & Villarreal, *Phytotaxa* 577(1): 1–13.
8.	*A. brazoensis* Buckl., *Proc. Philad. Acad. Arts* 454. 1861.
9.	*A. carminis* Barneby*, Leafl. W. Bot.* 7: 37. 1953.
10.	*A. cenorrhynchus* Barneby, *Brittonia* 34(1): 78–80. 1982.
11.	*A. circumdatus* Greene, *Pittonia* 1: 173. 1888.
12.	*A. coahuilae* M. E. Jones, *Rev. N. Amer. Astragalus* 256. 1923.
13.	*A. cobrensis* A. Gray var. *maguirei* Kearney, *Wash. Jour. Acad. Sci.* 30: 218. 1940.
14.	*A. coccineus* (Parry) Brandegee, *Zoë* 2: 72. 1891.
15.	*A. comonduensis* A. E. Estrada, Rebman & Villarreal, *Phytotaxa* 391(1): 59–60. 2019.
16.	*A. coriaceus* Hemsl., *Biol. Cent.-Amer., Bot.* 1(3): 263–264.
17.	*A. crotalariae* (Benth.) A. Gray, *Proc. Amer. Acad. Arts* 6: 216. 1864.
18.	*A. daleae* Greene, *Pittonia* 1(9): 153. 1888.
19a.	*A. didymocarpus* Hook. & Arn. var. *didymocarpus*, *Bot. Beechey Voy.* 334, pl. 81. 1840.
19b.	*A. didymocarpus* Hook. var. *dispermus* (A. Gray) Jeps.*, Fl. Calif.* 2(4): 376–377. 1936.
19c.	*A. didymocarpus* Hook. & Arn. var. *obispensis* (Rydb.) Jeps., *Fl. Calif.* 2(4): 376–377. 1936.
20.	*A. diphacus* S. Watson, *Proc. Amer. Acad. Arts* 17: 342. 1881–82.

...Continued on the next page

TABLE 1. (Continued)

21a.	*A. douglasii* var. *glaberrimus* M. E. Jones, *Proc. Calif. Acad. Sci., ser. 2,* 5(18): 645. 1895.
21b.	*A. douglasii* var. *parishii* (A. Gray) M. E. Jones, *Contr. West Bot.* 8: 6. 1898.
21c.	*A. douglasii* var. *perstrictus* (Rydb.) Munz & McBurney ex Munz, *Bull. S. Calif. Acad. Sci.* 31(2): 65. 1932.
22.	*A. emoryanus* (Rydb.) Cory var. *emoryanus*, *Rhodora* 38(455): 406.1936.
23a.	*A. ervoides* Hook. & Arn.var. *ervoides*, *Bot. Beechey Voy.* 417. 1840.
23b.	*A. ervoides* Hook & Arn. var. *maysillesii* Barneby, *Mem. New York Bot. Gard.* 13: 448–450. 1964.
24.	*A. esperanzae* M. E. Jones, *Rev. N.-Amer. A.* 277. 1923.
25.	*A. fastidius* (Kellogg) M. E. Jones, Contrib. *W. Bot.* 8: 7. 1898.
26.	*A. filipes* A. Gray, *Proc. Amer. Acad. Arts* 6: 226. 1864.
27.	*A. francisquitensis* M. E. Jones, *Proc. Calif. Acad. Ser. 2*, 5: 666. 1895.
28.	*A. gambelianus* E. Sheld., *Bull. Geol. Nat. Hist. Surv.* 9: 21. 1894.
29.	*A. gentryi* Standl., *Fiel. Mus. Bot. Ser.* 22: 22. 1940.
30.	*A. giganteus* S. Watson, *Proc. Amer. Acad. Arts* 17: 370.1882.
31.	*A. goldmanii* M. E. Jones, *Rev. N.-Amer. A.* 281. 1923.
32.	*A. greggii* S. Watson, *Proc. Amer. Acad. Arts* 17: 343. 1882.
33.	*A. gruinus* Barneby, Mem. *N. Y. Bot. Gard.* 13: 848. 1964.
34.	*A. guanajuatensis* Rzed. & Calderón, *Acta Botanica Mexicana* 110: 2. 2015
35a.	*A. guatemalensis* Hemsl. var. *guatemalensis*, *Biol. Centr.-Amer. Bot*. 1: 266. 1880.
35b.	*A. guatemalensis* Hemsl. var. *brevidentatus* (Hemsl.) Barneby, *Mem. New York Bot. Gard.* 13: 154. 1964.
35c.	*A. guatemalensis* Hemsl. var. *lozani* M. E. Jones, *Rev. N.-Amer. A.* 189. Pl. 43. 1929.
36.	*A. harbisonii* Barneby, *Leafl. W. Bot.* 7: 34. 1953.
37.	*A. harshbergeri* (Rydb.) A. E. Estrada, Villarreal & A. Delgado. Phytotaxa 470(2): 127–130
38.	*A. hartmanii* Rydb., in *N. Amer. Fl.* 24: 442. 1929.
39.	*A. hartwegii* Benth., *Pl. Hartw.* 10. 1839.
40.	*A. helleri* Fenzl, *Bonplandia* 8: 56. 1860.
41a.	*A. hidalgensis* (Rydb.) Barneby var. hidalgensis, *Mem. New York Bot. Gard.* 13(1): 175. 1964.
41b.	*A. hidalgensis* (Rydb.) Barneby var. *protensus* Barneby, *Mem. New York Bot. Gard.* 13(1): 176. 1964.
42a.	*A. hintonii* Barneby, var. *hintonii*, *Mem. New York Bot. Gard.* 13(1): 156–157. 1964.
42b.	*A. hintonii* Barneby var. *cofrensis* Barneby, *Mem. New York Bot. Gard.* 13: 158. 1964.
43.	*A. hornii* A. Gray var. *minutiflorus* M. E. Jones, *Proc. Calif. Acad. Sci. Arts* II. 5: 677. 1895.
44a.	*A. humistratus* A. Gray var. *humistratus*, *Pl. Wright.* 2: 43: 1853.
44b.	*A. humistratus* A. Gray var. *sonorae* (A. Gray) M. E. Jones, *Contr. W. Bot.* 10: 58. 1902.
45.	*A. hypoleucus* S. Schauer, *Linnaea* 20: 747. 1847.
46.	*A. hypoxylus* S. Watson, *Proc. Amer. Acad.* 18. 192. 1883.
47.	*A. idrietorum* Barneby, Shreve & Wiggins, *Veg. Fl. Sonoran Des.* 1: 703. 1964.
48a.	*A. insularis* Kellogg var. *insularis*, *Bull. Calif. Acad. Sci. Arts* 1: 6: 1884.
48b.	*A. insularis* var. *harwoodii* Munz & McBurney, *Bull. S. Calif. Acad. Sci.* 31: 66. 1932.
48c.	*A. insularis* Kellog var *quentinus* M. E. Jones, *Contr. W. Bot.* 8: 6. 1898.
49.	*A. jaliscensis* (Rydb.) Barneby, *Mem. N. Y. Bot. Gard.* 13: 167–168
50.	*A. legionensis* Barneby, *Mem. N. Y. Bot. Gard.* 13: 156. 1964.
51a.	*A. lentiginosus* Douglas var. *borreganus* M.E. Jones, *Fl. Bor.-Amer.* 1(3): 151. 1831.
51b.	*A. lentiginosus* Douglas var. *australis* Barneby, *Leafl. W. Bot.* 4: 117. tab III, fig. 15–19. 1945.
52.	*A. longissimus* (M. E. Jones) Barneby, *Mem. New York Bot. Gard.* 13(1): 183. 1964.
53.	*A. lotiflorus* Hook., *Fl. Bor.-Amer.* 1(3): 152. 1831.
54.	*A. lyonnetii* Barneby, *Mem. New York Bot. Gard.* 13(1): 162. 1964.
55a.	*A. magdalenae* Greene var. *magdalenae*, *Pittonia* 1(4): 162. 1888.

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TABLE 1. (Continued)

55b.	*A. magdalenae* var. *niveus* (Rydb.) Barneby, *Aliso* 4: 135. 1958.
55c.	*A. magdalenae* var. *peirsonii* (Munz & McBurney) Barneby, *Aliso* 4: 135. 1958.
56.	*A. mario-sousae* A. E. Estrada, A. Villarreal & C. Yen, *Brittonia* 57(4): 314. 2005.
57.	*A. martinii* Spellenb., Van Devender & Jenkins. *Phytoneuron* 66:1–8. 2014.
58a.	*A. micranthus* Desv. var. *micranthus*, *J. Bot. Agric.* 3: 78. 1814.
58b.	*A. micranthus* var. *seatoni* (M. E. Jones) Barneby, Mem. *New York Bot. Gard.* 13(1): 187. 1964.
59a.	*A. mollissimus* Torr. var. *bigelovii* (A. Gray) Barneby, *Mem. New York Bot. Gard.* 13(2): 743. 1964.
59b.	*A. mollissimus* var. *earlei* (Rydb.) Tidestr., *Proc. Biol. Soc. Wash.* 48: 40. 1935
59c.	*A. mollissimus* var. *irolanus* (M. E. Jones) Barneby, *Mem. New York Bot. Gard.* 13: 740.1964.
60.	*A. moranii* Barneby, *Brittonia* 28: 278. 1976.
61.	*A. nothoxys* A. Gray, *Proc. Amer. Acad. Sci. Arts* 4: 232. 1864.
62a.	*A. nuttallianus* DC. Var. *nuttallianus*, Prodr. [A. P. de Candolle] 2: 289. 1825.
62b.	*A. nuttallianus* var. *austrinus* (Small) Barneby, Shreve & Wiggins, Veg. Fl. Son. Des. 709. 1964.
62c.	*A. nuttallianus* var. *cedrosensis* M. E. Jones, *Rev. N.-Amer. Astragalus.* 270. Pl. 68, 1923.
62d.	*A. nuttallianus* var. *imperfectus* (Rydb.) Barneby, *Leafl. W. Bot.* 3: 1009. 1942.
62e.	*A. nuttallianus* var. *trichocarpus* Torr. A. Gray, *Fl. N. Amer.* 1: 333. 1838.
62f.	*A. nuttallianus* var. *zapatanus* Barneby, *Field and Lab.* 24: 36. 1956.
63.	*A. orcuttianus* S. Watson, *Proc. Amer. Acad. Sci. Arts* 20: 361. 1885.
64.	*A. oxyphysopsis* Barneby, *Brittonia* 28: 273. 1976.
65.	*A. oxyphysus* A. Gray, *Proc. Calif. Acad. Sci.* 6: 218. 1864
66.	*A. oxyrhynchus* Hemsl., *Biol. Cent.-Amer., Bot.* 1: 265. 1880.
67.	*A. palmeri* A. Gray, *Proc. Amer. Acad. Arts* 7: 398. 1868.
68.	*A. parvus* Hemsl., *Biol. Cent.-Amer., Bot.* 1: 266. 1880.
69.	*A. pennellianus* Barneby, *Mem. New York Bot. Gard.* 13: 170. 1964.
70.	*A. pilosior* R.W. Spellenb. & E.W. Anderson *J. Bot. Res. Inst. Texas* 13(1): 131–140. 2019.
71.	*A. piscinus* (M. E. Jones) Barneby, Shreve & Wiggins, *Veg. Fl. Sonoran Des.* 1: 703. 1964.
72.	*A. pomonensis* M. E. Jones, *Contr. W. Bot.* 10: 59, pl. 9. 1902.
73.	*A. pomphocalyx* Villarreal & M. A. Carranza, *Brittonia* 46(4): 337. 1994.
74.	*A. potosinus* Barneby, Mem. *New York Bot. Gard.* 13: 166. 1964.
75.	*A. pringlei* S. Watson, *Proc. Amer. Acad. Arts* 21: 449. 1886.
76.	*A. prorifer* M. E. Jones, *Zoë* 4(3): 275. 1893.
77.	*A. pueblae* M. E. Jones, *Contr. W. Bot.* 14: 35. 1912.
78.	*A. purpusii* M. E. Jones, *Contr. W. Bot.* 14: 34. 1912.
79.	*A. quinqueflorus* S. Watson, *Proc. Amer. Acad. Arts* 21: 450. 1886.
80.	*A. racemosus* Pursh var. *racemosus*, *Fl. Amer. Sept. (Pursh)* 2: 740.
81.	*A. radicans* Hornem. *Hort. Bot. Hafn.* 2: 708. 1815.
82.	*A. regiomontanus* Barneby, *Mem. New York Bot. Gard.* 13: 168. 1964.
83.	*A. rupertii* Villarreal & M. A. Carranza, *Brittonia* 46(4): 335. 1994.
84.	*A. sabulonum* A. Gray, *Proc. Amer. Acad. Arts* 13: 368. 1878.
85.	*A. sagitticarpus* A.E. Estrada, Villarreal & Encina, *Phytotaxa* 166–167. 2020
86.	*A. sanctorum* Barneby, *Brittonia* 28: 275. 1976.
87.	*A. sanguineus* Rydb., *N. Amer. Fl.* 24(7): 443. 1929.
88.	*A. scalaris* S. Watson, *Proc. Amer. Acad. Arts* 23: 270.1888.
89.	*A. scutaneus* Barneby, *Amer. Midl. Naturalist* 55: 502. 1956.
90.	*A. sinaloae* Barneby, *Mem. New York Bot. Gard.* 13(1): 450. 1964.
91.	*A. spellenbergii* A. E. Estrada, S. González & Villarreal, *Phytotaxa* 288(1): 92. 2016.

...Continued on the next page

TABLE 1. (Continued)

92.	*A. strigulosus* Kunth, *Nov. Gen. Sp.* 6. 494.
93.	*A. tephrodes* A.Gray, *Smithsonian Contr. Knowl.* 5(6): 45 (1853).
94.	*A. thurberi* A. Gray, *Pl. Nov. Thurb.* 312. 1854.
95.	*A. tijuanensis* A. E. Estrada, Rebman, C. González & Villarreal, *Phytotaxa* 577(1): 1–13.
96.	*A. tioides* (Rydb.) Barneby, *Mem. New York Bot. Gard.* 13: 171. 1964.
97.	*A. tolucanus* Robinson & Seaton, *Proc. Amer. Acad. Arts* 28: 104. 1893.
98.	*A. trichopodus* (Torr. & A. Gray) A. Gray var. *lonchus* (M. E. Jones) Barneby, *Mem. New York Bot. Gard.* 13: 821. 1964.
99.	*A. vaccarum* A. Gray, *Smithsonian Contr. Knowl.* 5(6): 43. 1853.
100.	*A. waterfallii* Barneby *Leafl. W. Bot.* 7: 31. 1953.
101a.	*A. wootonii* E. Sheld. var. *wootonii*, *Minn. Bot. Stud.* 9: 138. 1894.
101b.	*A. wootonii* E. var. *candollianus* (Kunth) Barneby, *Amer. Midl. Naturalist* 41: 498. 1949.
102.	*A. zacatecanus* (Rydb.) Barneby, *Mem. New York. Bot. Gard.* 13: 165. 1964.

Material and methods

Mexico is located from parallel 14°30'N to parallel 32°33'N. The country is traversed latitudinally almost in its central part by the Tropic of Cancer; this imaginary line separates the semi-arid zones of the north of the subtropical and tropical zones of the south. The study area comprises all 32 states of Mexico, a surface of almost 2 million of square kilometers. It has one of the most rugged physiographies on the planet (Rzedowski, 1978), all these geographical features are divided into 15 physiographic regions: Peninsula de Baja California, Llanura Sonorense, Sierra Madre Oriental, Sierra Madre Occidental, Sierras y Llanuras del Norte, Gran Llanura de Norteamérica, Llanura Costera del Golfo Norte, Llanura Costera del Pacífico, Meseta Central, Eje Neovolcánico Transversal, Peninsula de Yucatán, Sierra Madre del Sur, Lanura Costera del Golfo Sur, Sierra de Chiapas and Guatemala, and Cordillera Norteamericana (INEGI, 1986). In Mexico there are 4 of the 5 major climate types (A, B, C and E), and seven main climatic subtypes (Af, Am, BW, BS, Cw, Cs and Ef). Along with Perú and India, Mexico is one of the three countries that has all the types of biomes on the planet such as tundra (alpine), taiga, deserts, and tropical and subtropical areas (Rzedowski, 1978). Such heterogeneity in physiography, climate and biomes harbor a rich number of plant communities dominated by temperate mixed forest (oak-pine), cool and temperate conifer forest, scrublands, climatic and edaphic grasslands, tropical and subtropical forest, these communities include different plant associations related directly to the climate, physiography and soil types. This great abundance of geological, climatic, and edaphic factors has created an incredible diversity of organisms, which places Mexico as one of the most megadiverse countries of the planet, especially with regard to flowering plants, with almost 21,841 species (Villaseñor & Ortíz, 2014).

The present work consisted of two phases; the first was collections of specimens by the authors from 1984 to present. The botanical material was collected mainly in the states of the northern part of the country, Baja California, Baja California Sur, Sonora, Chihuahua, Coahuila, Nuevo León, Tamaulipas, San Luis Potosí, and Zacatecas, where much of our work was focused, although samples of *Astragalus* have also been collected in some areas of southern Mexico. The specimens that we collected have been deposited in different national and foreign herbaria. The second phase of this taxonomic work consisted by reviewing botanical samples of *Astragalus* deposited in the scientific collections of different national and foreign herbaria. The herbaria visited and consulted include: ANSM, BCMEX, CAS, CFNL, CIIDIR, ENCB, IBUG, IEB, JEPS, MEXU, NYBG, SD, TEX-LL, US, and USON; acronyms are according to Thiers (2021). Plant specimens were identified mostly by using Barneby´s monographic treatment work (1964) as the main source of knowledge, accompanied by regional specialized literature concerning *Astragalus* taxonomy (Barneby 1964, Shreve & Wiggins 1964, Correll & Johnston 1970, Wiggins 1980, MacVaugh 1987, Henrickson & Johnston 1997, Rzedowski 2010, Estrada *et al.*, 2014; Rebman *et al.* 2016). To identify the species, morphological characters measured in both fresh and dry specimens were carried out. The measurements are given in milimeters and centimeters. Sometimes a "×" appears between two numbers and this indicates the length and the width, respectively. In this work we present a taxonomic study for the taxa of *Astragalus* in Mexico, that includes dichotomous keys to identify the species and infraspecies, synonyms recognized (based on The Plantlist.org and IPNI), morphological description of mature individuals in each species and infraspecific category, specimens examined and herbarium acronyms where

the sample is deposited. It also includes also maps with the geographic distribution for all species and infraspecies. In this study, we recognize *Astragalus* sensu Jones (1923) and Barneby (1964), a single and polymorphic genus, but subdivided into sections and subsections based on various morphological features.

The terminology associated with the morphological characters of *Astragalus* follows that of Barneby (1964). Although bracts, bractoles and pedicels are unique morphological characters to distinguish and differentiate some species, these characters have been omitted from the description because they are uniform for most of taxa in Mexico. A dichotomous key is included to identify species from all of Mexico. To facilitate the identification of species, the dichotomous key is regionalized to locate the reader in a specific region, the peninsula of Baja California, the northern states of Mexico (Sonora, Chihuahua, Coahuila, Nuevo León, Tamaulipas, Sinaloa, Durango, Zacatecas, Aguacalientes, and San Luis Potosí) and the southern states of Mexico (Nayarit, Jalisco, Guanajuato, Querétaro, Hidalgo, Morelos, Puebla, Veracruz, Colima, Michoacán, State of Mexico, Mexico City, Guerrero, Oaxaca, Chiapas, Tabasco, Campeche, Quintana Roo and Yucatán) (Fig. 1). The dichotomous keys are based mainly on the color of flowers, the shape of the pod and if the fruit is sessile or stipitate. In many cases, the presence of flowers and fruits are necessary for the identification of species.The enormous variability in the color of the petals of different species of *Astragalus* makes it necessary to implement dichotomous keys that allow us to encompass these differences; the same species can appear once or twice in the keys if their flowers are initially monochromatic and with time they turn bicolored, or they are bicolored at the beginning and with maturity or when drying they become monochromatic.

All type specimens cited below the scientific names and before the description of the species correspond to the barcode number of the herbarium where the specimen is stored.

FIGURE 1. Map showing the three zones into which the study of *Astragalus* of Mexico was divided. Zone 1 (Peninsula of Baja California), Zone II (North of Mexico), and Zone III (South of Mexico).

Results and Discussion

Diversity

Astragalus is represented in Mexico by 102 species and 47 infraspecific taxa (Table 1). Seventy one species and 18 varieties are endemic to Mexico. Eighty-five species and 37 varieties are distributed north of the Tropic of Cancer, while 24 species and 19 varieties are distributed south of it. Baja California (26), Chihuahua (25), Durango (23), Sonora (22), Coahuila (20), San Luis Potosí (17), Nuevo León (17), and Zacatecas (15) are the states with the greatest species richness. In Mexico, the diversity of *Astragalus* species decreases from north to south and from west to east. Most of the species of *Astragalus* in Mexico are distributed in the mountains, followed by low and arid plains, including coastal dunes, those last ones, exclusively of the northwestern region. There are no records of any *Astragalus* species in Campeche, Tabasco, or Yucatan.

Endemism

Seventy one species of *Astragalus* are endemic to Mexico, 43 of them are distributed only in the states of the northern region (Baja California, Baja California Sur, Sonora, Sinaloa, Chihuahua, Durango, Coahuila, Zacatecas, Nuevo León, San Luis Potosí, and Tamaulipas), 32 of these restricted to the northwestern states (Baja California, Baja California Sur, Sonora, Sinaloa, Chihuahua, Durango), while the other 11 species are distributed in the northeastern states (Coahuila, Zacatecas, Nuevo León, San Luis Potosí, and Tamaulipas). Sixteen species are endemic to the states of the southern region (Nayarit, Jalisco, Guanajuato, Querétaro, Hidalgo, Morelos, Puebla, Veracruz, Colima, Michoacán, State of Mexico, Mexico City (D.F.), Guerrero, Oaxaca, Chiapas, Tabasco, Campeche, Quinta Roo and Yucatán) and 12 endemic species to Mexico are distributed in both northern and southern regions. Twelve species and three varieties are endemic to Baja California: *A. anemophilus* Greene (1885: 186)*, A. brauntonii* var. *lativexillum* A. E. Estrada, Rebman, C. González & Villarreal (2022: 6)*, A. circumdatus* Greene (1888: 173), *A. douglasii* var. *glaberrimus* (M.E. Jones (1895: 645)*, A. gruinus* Barneby (1964: 847)*, A. harbisonii* Barneby (1953: 34)*, A. idrietorum* Barneby (1964: 703)*, A. insularis* var. *quentinus* M.E. Jones (1898: 6)*, A. moranii* Barneby (1976: 278)*, A. oxyphysopsis* Barneby (1976: 273)*, A. piscinus* (M.E. Jones (1895: 645*, A. sanctorum* Barneby (1976: 275), and *A. tijuanensis* A. E. Estrada, Rebman, C. González & Villarreal (2022: 2). Chihuahua has four endemic species (*A. giganteus* S. Watson (1882: 370)*, A. hartmanii* (Rydb. (1929: 442)*, A. pilosior* Spellenb. & E.W. Anderson (2019: 131)*,* and *A. scalaris* S. Watson (1888: 270), Durango has two endemic species (*A. pennellianus* Barneby (1964: 170)*,* and *A. spellenbergii* A. E. Estrada, S. González & Villarreal (2016: 92)), Coahuila has two endemic species *(A. carminis* Barneby (1953: 37) and *A. rupertii* Villarreal & M. A. Carranza (1994: 335). Nuevo León has two endemic species (*A. mario-sousae* A. E. Estrada, Villarreal & Yen-Méndez (2005: 314–319) and *A. regiomontanus* Barneby (1964: 169). Baja California Sur has two endemic species (*A. comonduensis* and *A. francisquitensis* M. E. Jones (1895: 666))). Sonora has only one endemic species (*A martinii* Spellenb., Van Devender & P. D. Jenkins (2014: 66)). San Luis Potosí has only one endemic species (*A. tioides*). Plus, four taxa are endemic to the Baja California peninsula in both Baja California and Baja California Sur (*A. hornii* var. *minutiflorus* M. E. Jones 1895: 677), *A. insularis* var. *insularis* Kellog (1884: 6), *A. magdalenae* Greene (1888: 162), and *A. proriferus* M. E. Jones (1893: 275).

For the southern states, *A. guatemelensis* var. *brevidentatus* (Hemsl.) Barneby (1964: 154) distribute in several states, Oaxaca has one endemic species (*A. cenorrhynchus* Barneby (1982: 78)), Guanajuato has one endemic species (*A. guanajuatensis* Rzed. & Calderón (2015: 110))*,* Hidalgo has one endemic varieity (*A. hidalgensis* (Rydb) Barneby (1964: 176)), Veracruz has one endemic variety (*A. hintonii* var. *cofrensis* Barneby (1964: 158)), Puebla has one endemic species (*A. pueblae* M. E. Jones (1912: 35), and Morelos has one endemic species (*A. sagitticarpus* A. E. Estrada, Villarreal & Encina (2020: 166)).

Taxonomy

Astragalus L. Sp. Pl, 755. 1753 & Gen. Pl, Ed. 5, 335. 1754

Type species:—*Astragalus alpinus* L., Sp. Pl. 2: 760. 1753.

In Mexico, **always herbaceous**, annual, or perennial, commonly caulescent, rarely acaulescent, occasionally, the stems emerging from a subterranean caudex, rarely rooting at nodes, resembling stolons. Pubescence simple or dolabriform

(knife-shaped), trichomes with a central axis and two lateral arms of the equal or different size, almost always one arm longer than the other. **Stipules** free or adherent to the petiole, clasping or clasping and connate, forming a sheath, commonly ciliate on the margins. **Leaves** ordinarily imparipinnate, petiolate or subsessile, leaflets commonly in pairs or occasionally subalternate along the rachis; stipels absent. **Inflorescences** pedunculate, rarely subsessile, arranged in clusters, umbels or axillary head-like; bracts small, membranous; bractlets 0–2, little, membranous or scaly, at the base of the calyx. **Flowers** papilionate (zygomorphic), commonly small, sometimes large and showy, regularly with graduated petals, very rarely, the keel equal or longer than wings, purple, red, violet, pink, white, yellow, whitish to pale yellow or a combination of two or even three colors on a flower; calyx campanulate, cylindrical, infrequently urceolate, symetrical or asymetrical at base, sometimes breaking on one side as the fruit develops, teeth 5, equal or subequal, triangular to lanceolate; the banner erect, regularly bent back to varying degrees in the distal middle, rounded or retuse at apex, rarely with a small basal claw; the wings regularly oblique-oblong, auriculate and basally clawed; the keel equal or shorter than wings, rarely longer, commonly incurved distally, auriculate and clawed; stamens 10 and diadelphous (9+1); the anthers isomorphic; ovary sessile to stipitate, unilocular, with few to many ovules; style filiform, glabrate, stigma terminal, glabrate. **Pod** variable in size, shape, texture and dehiscence, sessile or stipitate and attached to the receptacle, or elevated in either a stipe continuous with the pod or in a gynophore (similar to a stipe but articulate and brittle, allowing the fruit be detached from the receptacle at this joint), linear, oblong, elliptical, ovoid, obovate, clavate or bladder-shaped, straight or curved, cylindrical, laterally compressed, dorsoventrally or triquetrically (triangular in cross-section), commonly longitudinally grooved on the back, opaque, semitransaprent or diaphanous, papyraceous, leathery to coriaceous, the dorsal suture intruded, to form an incomplete or complete longitudinal septum, dividing the pod cavity into two chambers; 2-many ovules, dehiscence in situ or after detachment and fall; seeds reniform or mitt-shaped, variables in color and texture.

Currently, in Mexico, there are no *Astragalus* species in protection status within NOM-096-2010 (2010), However, IUCN Threatened species (2022) register 30 species of *Astragalus* occurring in North America and Mesoamerica, most of them consider as Least Concern. Seven of these occur also in Mexico: *A. didymocarpus* H. & A. (1840: 334), *A. ervoides* H. & A. (1840: 417); *A. crotalariae* A. Gray (1864: 216); *A. lentiginosus* Douglas (1931: 151); *A. mollissimus* Torr. (1827: 179); *A. nuttallianus* Speg. (1902: 265), and *A. waterfallii* (Barneby (1953: 31). Of the total of species in Mexico, at least 17 of them have restricted distribution to a state, a municipality, or the type locality. Thirteen of these species are distributed in the northern states, from Baja California Sur to Nuevo León and San Luis Potosí. Thirteen of these species are found in mesic or cold climates, in mountains and portions of the highlands, and the other 14, distribute in low plains from arid, semi-arid, and Medeterranean climates. Among the most endangered species that are most in danger of disappearing because of human impact are *A. radicans* Hornem (1815: 708) and *A. harshbergeri* (Rydb.) A.E.Estrada, Villarreal & A.Delgado (470:127–130), since they are distributed in the area of the Valley of Mexico surrounding Mexico City and high mountain areas subject to great anthropogenic pressure in the state of Mexico. The last collections recorded for both species were made in the State of Mexico, 1982, *A. radicans* (Rzedowski 37875 (ENCB, IEB)) and 1972, *A. harshbergeri* (Rzedowski 29055 (CAS, ENCB)). Other species that can be considered at least threatened because of their restricted distribution, inhabiting only in one ecosystem, anthropogenic disturbance, human settlement construction and habitat destruction are: *A. cenorrhynchus* Barneby (1982: 78–80) (Oaxaca) only known from the type locality, *A. comonduensis* A. E. Estrada, Rebman & Villarreal (2019:59–60) (Baja California Sur), known only from two specimens collected at the edge of the Llano la Laguna. *Astragalus guanajuatensis* Rzed. & Calderón (2015: 110) (Guanajuato), *A. mario-sousae* A. E. Estrada, A. Villarreal & C. Yen (2005: 314) (Nuevo León), *A. moranii* Barneby (1976: 208) (Baja California), *A. oxyphysus* A. Gray (1864: 218) ((Baja California), *A. piscinus* M. E. Jones) (1895: 645) (Baja California Sur), *A. pilosor* R.W. Spellenb. & E.W. Anderson (2019: 131–140)(Chihuahua), *A. pueblae* M. E. Jones (1912: 35) (Puebla), A. *sagitticarpus* A. E. Estrada, Villarreal & Encina (2020: 166–167) (Morelos), *A. spellenbergii* A. E. Estrada, S. González & Villarreal (2016: 92) (Durango), and *A. tioides* (Rydb.) Barneby (1964: 171) (San Luis Potosí) are known only from the type locality; *A. harbisonii* Barneby (1953: 34) has a very restricted range adjacent to coast areas and tourism developments; *A. sanctorum* Barneby (1976: 275) (Baja California) is only known from the Punta Banda area and threatened with development by Ensenada.

Key to identify the taxa of *Astragalus* in Mexico.

1. Plants of the peninsula of Baja California (Zone I, Fig. 1) 2
- Plants not from the península of Baja California 36
2. Flowers red; plants acaulescent ..... ***A. coccineus***

- Flowers not red; plants caulescent or acaulescent 3
3. Pods 5 mm long or shorter, bilocular, 2-ovulate; annual plants 4
- Pod 5.5 mm long or longer uni or bilocular; ovules 4-many; annual or perennial plants 5
4. Flowers and fruits erect; petals 4–9.8 mm long; fruit transversally or diagonally sulcate with 4–7 ridges, almost included into the calyx when mature; Baja California and Sonora ..... ***A. didymocarpus***
- Flowers and fruits pendulous; petals 2.5–3.3 mm long, very rarely longer; fruit not transversally or diagonally sulcate, half of its length exerted from calyx; only in Baja California ..... ***A. gambelianus***

5. Petals large, banner 21–28 mm long; petals of the wings 19.5–25 mm long; keel petals 17.3–21 mm long; in Mexico, recorded only around Mexicali (Baja California) ..... ***A. crotalariae***
- Petals, all shorter; plants around Mexicali and other areas of Baja California and Baja California Sur 6
6. Pod triquetrous, linear-elliptic to oblong-elliptic but laterally compressed, never ellipsoid-flared or inflated, resembling a bladder 7
- Pod widened or inflated resembling a bladder or the pod faces inflated only in the area where seeds are located 12
7. Pod oblong to elliptic, laterally compressed, unilocular, narrowed at both ends, basally ending in a stipe ..... ***A. filipes***
- Pod triquetrous, laterally compressed, but bilocular or almost so, basally wide and sessile or ending in a stipe 8
8. Leaflets 23–33 per leaf; flowers 20–25 per raceme; calyx 6.1–8.1 mm long; wings 7.2–10.2 mm long ..... ***A. brauntonii* var. *lativexillum***
- Leaflets 5–15 per leaf; flowers 1–10 per raceme; calyx 2.6–5.6 mm long; wings 3.3–6 mm long 9
9. Keel petals tip acute beaked; pod apparently sessile, but elevated on a minute, articulated gynophore 0.3–0.8 mm long, thus soon falling from receptacle; only in Baja California ..... ***A. acutirostris***
- Keel petals tip commonly rounded; pod sessile or stipitate, if stipitate, elevated in a stipe continuous with the pod, thence it strongly attached to the receptacle and persistent for a time; Baja California and Baja California Sur 10
10. Pod stipitate, curved or sigmoid; plant perennial; leaves up to 18 cm long, the leaflets gradually decreasing in size towards the apex, the pairs separated by 2–3 times the width of each other ..... ***A. orcuttianus***
- Pod sessile, straight or curved; plant annual or biennial; leaves up to 8.5 cm long, the leaflets commonly the same size, and not widely separated 11
11. Pod straight or almost so; banner 8.1–10 mm long; wings 8–9.3 mm long; endemic to Sierra La Laguna, Baja California Sur ..... ***A. francisquitensis***
- Pod curved; banner 4–7.5 mm long; wings 3.7–6.2 mm long; Baja California and Baja California Sur ..... ***A. nuttallianus***
12. Pod elevated from the receptacle by a 0.4 mm long, but commonly 0.7 mm or longer stipe or gynophore 13
- Pod sessile in the receptacle, or, if elevated (rarely) from receptacle, not more than 0.4 mm 18
13. Pod elevated from receptacle by a true stipe, the stipe continuous with the receptacle, thence, the pod firmly attached to the receptacle; petals white, cream, ochroleucous, or rarely pink-purple veined 14
- Pod elevated from receptacle by a gynophore articulated (joined), not continuous with the receptacle, thence, the pod not firmly attached to the receptacle, soon caducous; petals white, cream, green-white, pink or purple 15
14. Stipe always strigulose, pod subglabrate to strigulose, inflated, never strongly flattened; along the entire western coast, from Rosarito to Santa Rosaliíta, also on the Coronados, Todos Santos in the Pacific Ocean and Smith´s Island ..... ***A. trichopodus* var. *lonchus***
- Stipe and pod glabrous, inflated resembling a bladder, but strongly compressed laterally, two-sided, its faces inflated only in the area where seeds are located; around Gustavo Diaz Ordaz, San Telmo, Potrero, Meling Ranch, El Jonuco, San Rafael and Mina Santa Cruz to El Canuto ..... ***A. oxyphysopsis***
15. Pod elevated in a very small, 0.4–0.7 mm long gynophore, non-exserted from calyx; petals rose-purple ..... ***A. proriferus***
- Pod elevated in a longer, 3–11 mm long gynophore, exserted from calyx; petals white immaculate, green-whitish, cream, blue-violet, purple, rose purple to blue when drying 16
16. Calyx 3.1–4.8 mm long; banner 8.3–9 mm long; petals of the wings 7.4–8.3 mm long, keel petals 7–8.2 mm long; petals purple, blue-violet, becoming blue when drying; gynophore 3–4 mm long, strigulose; endemic to the Sierra de Juárez, Baja California ..... ***A. moranii***
- Calyx 5.5–10.3 mm long; banner 13–19 mm long; petals of wings 12.3–18 mm long; keel petals 10–14.7 mm long; gynophore (3–)8.5–11 mm long; Baja California and Baja California Sur 17
17. Flowers 20–67 per raceme, white or cream, immaculate; calyx 8.5–10.3 mm long; keel petals 13–15 mm long; ovules 10–18 ..... ***A. oxyphysus***
- Flowers 7–18 per raceme, purple, pink-purple, green-white or cream and turning yellowish when drying; calyx 5.5–8.2 mm long; keel petals 10–11.2 mm long; ovules 20–27 ..... ***A. fastidius***
18. Stipules both, clasping and connate, surrounding the total stem´s circumference and forming a sheath around it 19
- Stipules free, clasping or decurrent, not connate 21
19. Plant small, the stems up to 11 cm long; peduncles 0.5–1.5 cm long; petals small, banner 7.3–10 mm long, wings 7–9.3 mm long, keel 6.9–8.8 mm long; mountains of Sierra de Juarez and Sierra de San Pedro Mártir; conifer forest, 1700–2475 m ..... ***A. circumdatus***
- Plants larger, the stems 30–70 cm long; peduncles 2.5–10 cm long; petals larger; coastal dunes 20
20. Pod relatively small, 1.5–2 cm long, minute strigose; leaflets 13–23; peduncles 2.5–10 cm long; ovules 22–27; west coast in central Baja California, from Nueva Odisea, El Socorrito, Valle Tranquilo to Punta Baja ..... ***A. harbisonii***
- Pod large, 2.7–4 cm long, minutely tomentose, the trichomes extremely fine and curly; leaflets 15–37; peduncles 8–16 cm long; ovules 32–40 from north of Camalú, Colonia Vicente Guerrero, Los Molinos, Campo San Ramón, Cabo San Quintín, Santa María to El Socorrito, El Socorro and Campo Costa Rica ..... ***A. anemophilus***
21. Pod widened, but not inflated resembling a bladder, stiff, 3–3.8 times longer than wide; far north of Baja California 22
- Pod inflated resembling a bladder, papyraceous, 2–2.5 times longer than wide 23

22. Pod bilocular, the septum complete; keel (9.5–)11.5–16.3 mm long, its blade 7–10 mm long ..... ***A. lentiginosus* var. *borreganus***
- Pod unilocular, septum absent; keel 9.4–9.8 mm long, its blade 4.6–5 mm long; known only fot he type locality (Tijuana City..... ***A. tijuanensis***
23. Racemes commonly with 10 flowers or fewer (rarely few more)..... 24
- Racemes 10 flowers or more 27
24. Petals ochroleucous pale rose, white or purple-lavender turning bluish with age, the banner 3.3–6.5 mm long; annual; ovules 3–9; pod erect 25

- Petals white, purple to ochroleucous and lavender-veined, longer, the banner up to 7.2 mm long; annual, biennial or perennial; ovules 12–19; pod extended or pendulous 26
25. Herbage densely white silky-canescent; leaflets not mucronate, equally pubescent in both adaxial and abaxial leaf surfaces; calyx 3.2–4.4 × 1.5–2.4 mm; ovules 3–7; pod scarcely inflated, not evidently bladdery, but laterally compressed at both ends and strongly so at the apex, the valves papery, opaque, densely white canescent to strigulose-pilose; extreme northeastern Baja California and northwestern Sonora..... ***A. aridus***
- Herbage green-strigulose, not densely pubescent; leaflets mucronate and glabrate adaxially, not equally pubescent on both leaf surfaces; calyx 2–2.8 × 1–1.2 mm; ovules 7–9; pod inflated, bladdery, not laterally compressed, shiny, sub-diaphanous, minutely-strigulose; Baja California Sur, near Comondú (26°06'N, 111°46'W)..... ***A. comonduensis***
26. Pod trichomes appressed and straight, the valves thin-papery and sub-diaphanous red to purple tinted; leaflets acute at both ends. ..... ***A. insularis***
- Pod trichomes somewhat curly, the valves firm, opaque, no trasluscent, sometimes with purple or dark-reddish tints; leaflets rounded to obtuse apically..... ***A. sabulonum***
27. Flowers and pods aggregated forming a compact globose, subglobose to oblong head; adjacent to coastal dunes, inhabiting in cemented terraces ..... ***A. hornii* var. *minutiflorus***
- Flowers and pods loosely racemose; coastal dunes, terraces, deserts and mountains..... 28
28. Plants densely silver-pubescent to leaden-pubescent, exclusive from sandy coastal dunes ..... ***A. magdalenae***
- Plants green of different tone to cinerous, neither silver nor leaden-pubescent, or if so, not from coastal dunes 29
29. Flowers white, ochroleucous, green-white or yellowish..... 30
- Flowers purple, rose-purple, sometimes rose brilliant 32
30. Wings 8–10.7 mm long; keel claw 2.3–4.4 mm long..... ***A. douglasii***
- Wings 11–15 mm long; keel claw 5.1–6 mm long..... 31
31. Foliage dense, the leaflets close to each other; banner 11–15.3 mm long; wings 10.6–15 mm long, almost the same length of the banner: leaflets 25–41, the longest averaging 15–37 mm long..... ***A. pomonensis***
- Foliage lax; the leaflets separated to each other; banner 14.4–17.8 mm long, evidently longer than the wings; wings 12.3–14.2 mm long; leaflets 17–31, the longest averaging 11–17 mm long ..... ***A. sanctorum***
32. Flowers relatively short; wings 5.5–8 mm long, the claw 2.2–2.8 mm long, the blade 3.8–5.7 mm long; keel 5.7–7.6 mm long, the claw 2.2–3.4 mm long, the blade 3.8–4.8 mm long; ovules 12–16..... 33
- Flowers larger; wings (7)8.5–11.6, the claw (2.8)3–4.9 mm long, the blade (4.5) 5.6–7.5 mm long; keel (6.3)7.7–9.2 mm long, the claw (2.5)3.7–4.8 mm long, the blade (4)5.1–5.5 mm long; ovules (7)24–31..... 34
33. Stems, leaves and pods with dense villous to hirsute pubescence, the trichomes spreading or somewhat incurved; the pod not sub-diaphanous..... ***A. proriferus***
- At least stems and leaves with strigulose pubescence, the trichomes appressed to subappressed; pod sparsely strigulose; the pod sub-diaphanous..... ***A. idrietorum***
34. Pod firmly attached to the receptacle, falling together with pedicel; flowers purple; plants on coniferous forest of San Pedro Mártir National Park..... ***A. gruinus***
- Pod soon caducous, not strongly attached to the receptacle; flowers purple, pink to pink-brilliant; plants on conifer forest and adjacent scrublands or in dune areas of low plains at the Pacific Ocean 35
35. Pod 5–15 mm long; fertile pedicels persistent; leaflets 11–21; petals purple to pink or rose-brilliant; banner 7–10.4 mm long; wings 6.3–9.4 mm long, its claw 2.4–3.8 mm long; conifer forest and adjacent scrublands in sierras de Juárez and San Pedro Mártir; Baja California..... ***A. palmeri***
- Pod 20–30 mm long; fertile pedicels caducous; leaflets 15–25; petals purple; banner 10–13 mm long; wings 9.2–11.5 mm long, its claw 4–4.9 mm long; low plains at the Pacific Ocean, in extreme southwestern Baja California to the west of Jesús María ..... ***A. piscinus***
36. Plants of Sonora, Chihuahua, Coahuila, Nuevo León, Tamaulipas, Sinaloa, Durango, Zacatecas, Aguacalientes, and San Luis Potosí (Zone II, Fig. 1) 37
- Plants of Nayarit, Jalisco, Guanajuato, Querétaro, Hidalgo, Morelos, Puebla, Veracruz, Colima, Michoacán, State of Mexico, Mexico City, Guerrero, Oaxaca, and Chiapas (Zone III, Fig. 1)..... 108
37. Pubescence dolabriform, the trichomes joined at a point before the end, in the form of "v" or "t", with equal or unequal ends 38
- Pubescence basifixed with simple trichomes 42
38. Petals ochroleucous, greenish-white or lavander or, at least the veins with lavender tones, sometimes dyed purple or blue-purple at the apex or the edges; stems 12 cm long or shorter; calyx teeth up to 5.2 mm long; in Mexico recorded only in Coahuila..... ***A. lotiflorus***
- Petals green-whitish, pink-whitish, magenta, purple-magenta, purple or pink; stems 15 cm long or longer; calyx teeth up to 4.5 mm largo; Coahuila and other states..... 39
39. Leaves 7.5 cm long or shorter; peduncles 2–10.5 cm long; keel 10 mm long or shorter; calyx tube (3.1–)4.1–10.5 mm long..... 40
- Leaves up to 13 cm long; peduncles (2.5)10–20 cm long; keel (8.2)10–19.6 mm long; calyx tube (2.2)3–3.8 mm long 41
40. Pod deflexed, bilocular; 7–12.5 mm long, triquetrous, oblong to narrow-oblong; calyx 3.1–5.2 mm long, the teeth up to 2.6 mm

largo; banner 6–8.2 × 3–4.3 mm; keel 4.5–6.6 mm long; wide distribution, but not in Chihuahua and Sonora ..... ***A. hypoleucus***

- Pod ascendant, unilocular, (10–)13–22 mm long, inflated resembling a bladder, oblong-elliptic; calyx (4.5)5.8–8 mm long, the teeth 2–4.5 mm long; banner 8.3–11.8 × 6–9 mm; keel 7.3–10 mm long; Chihuahua and Sonora ..... ***A. humistratus***

41. Flowers relatively small; calyx 4.5–7 mm long; banner 8–12 mm long, wings 6.7–10 mm long, keel petals 8–10.4 mm long; leaflets (5–)9–17; pod triquetrous, straight, semi-straight, rarely slightly curved, linear to linear-oblong, 4 mm wide or narrower, bilocular, no humistrate; stipules free; Sonora ..... ***A. arizonicus***

- Flowers larger; calyx 9.3–14.2 mm long; banner 16.2–24.5 mm long, wings 15.1–22.4 mm long, keel petals 13.2–19.6 mm long; leaflets (7–)11–21; pod somewhat triquetrous but semi-lunate, 5–10 mm wide, unilocular, humistrate; stipules semi to completely clasping; Chihuahua ..... ***A. amphioxys***

42. Petals all red; banner 22–32 mm long; wings 18–31 mm long; keel petals 18–27 mm long; Coahuila and Nuevo León ..... ***A. sanguineus***

- Petals of another color, or if red, combined with another color; banner smaller than 21 mm long, wings and keel smaller than 17 mm long 43

43. Calyx 2.8–3 cm long; petals yellow; endemic of Chihuahua ..... ***A. hartmanii***

- Calyx 1.5 cm long or shorter; petals yellow or different colors; Chihuahua and other states 44

44. Pod strongly dorso-ventrally flattened, in a wide “u” shaped or car winshield shaped, curved as seen of profile, frequently wider than longer, sessile or elevated in a gynophore, in north of Mexico, locally distributed in far north of Tamaulipas (Matamoros), north-central Coahuila and south-western San Luis Potosí 45

- Pod not strongly dorso-ventrally flattened, commonly longer than wider, or if wider than longer, then inflated or widened, sessile or stipitate; Tamaulipas, San Luis Potosí, and other states 46

45. Leaflets 11–13 per leaf; pod elevated in a gynophore 1.5–2.3 mm long; Coahuila and Tamaulipas ..... ***A. brazoensis***

- Leaflets 15–23 per leaf; pod sessile; San Luis Potosí ..... ***A. scutaneus***

46. Pod 4 mm long or shorter, bilocular, bi-ovulate, when ripe, it separates into two indehiscent sacs containing one seed each; annual weak plants; northern end of Sonora ..... ***A. didymocarpus* var. *dispermus***

- Pod 4 mm or longer, uni to bilocular, ovules 3 or more, if pod 2-ovulate, it entirely dehiscent; plants perennial; Sonora and other states 47

47. Bracts cymbiform (boat shaped); pod triquetrous, sessile, 7–12 mm long; leaves 3–7.5 cm long; leaflets 2–10 mm long; peduncles 4–10 cm long; calyx 2.7–3.6 mm long; banner 5.6–6.5 mm long; Chihuahua and Durango ..... ***A. daleae***

- Bracts flattened, never cymbiform; pod triquetrous, inflated resembling a bladder or of different shape, sessile to stipitate; leaves, peduncles and flowers with varied sizes 48

48. Pubescence of stems, petioles and peduncles dense, hispid to pilose, the trichomes straight extended or retrorse; Coahuila, Nuevo León and Durango 49

- Pubescence of stems, petioles and peduncles with trichomes appressed and ascendant, never straight extended or retrorse 52

49. Pod oblong to narrow-oblong, exserted from calyx; calyx campanulate, 4.3–6.7 mm long; banner 6.5–10.2 mm long; wings 5.2–9.2 mm long; keel 4–7.2 mm long; ovule 6–18; Durango, Coahuila, Nuevo León and San Luis Potosí 50

- Pod wide-oblong, inflated, immersed in the calyx; calyx urceolate-globose to urceolate-suboblong, 8–10 mm long; banner 13.8–16 mm long; wings 11.8–13 mm long; keel 9–11 mm long; ovules 4; Coahuila and Nuevo León 51

50. Petals purple, light-purple but turning ochroleuocus quickly and remaining so when dry; pod sessile or stipitate, stipe 0.2–3 mm long; stems up to 65 cm long; calyx 5–6.7 mm long; banner 7.2–10.2 × 5.3–7.7 mm; wings 7.2–9.2 mm long; keel 6–7.2 mm long; pod 10–18 mm long; ovules 9–18; Coahuila, Nuevo León and San Luis Potosí ..... ***A. greggii***

- Petals yellow; pod short stipitate, stipe 0.2–0.3 mm long; stems up to 15 cm; calyx 4.3–4.7 mm long; banner 6.5–7.2 × 2.8–3 mm; wings 5.2–5.3 mm long; keel 4–4.2 mm long; pod 7–8 mm long; ovules 6–7; endemic of Durango ..... ***A. spellenbergii***

51 Peduncles shorter than leaves; racemes congested, 2–5 cm long; calyx urceolate-globose, with white trichomes only; Coahuila and Nuevo León ..... ***A. pomphocalyx***

- Peduncles as long as or longer than leaves; racemes loose, 3–10 cm long; calyx urceolate-suboblong, with black and white trichomes mixed; endemic of Coahuila ..... ***A. rupertii***

52. Keel of the same size or little longer than petals of the wings; Sonora, Chihuahua and Sinaloa ..... ***A. gentryi***

- Keel shorter than petals of the wings; Sonora, Chihuahua, Sinaloa and other states 53

53. Petals pink, purple, lavander, lilac, cherry, violet, purple-reddish, bicolored (even in its venation or some part of the petals) or white, but mixed with other color, but never green-withish o green-yellowish 54

- Petals all white, cream, yellow, pale-yellow, ochroleucous, concolorous, if bioclored, these green-whitish or green-yellowish 96

54. Pod triquetrous (rarely laterally compressed in *A. nothoxys*) to trigonous, triangular in cross section, flattened or somewhat widened or inflated, but triquetrous 55

- Pod flattened dorso-ventrally, linear-oblong, oblong-elliptic, obovate, oblong-ellipsoid, clavate-oblong, lanceolate-elliptic, widened, wide-cylindric to inflate resembling a bladder, never triquetrous 76

55. Plants acaulescent, the longest leaves commonly larger than stems; rare in Mexico, recorded only in north end of Chihuahua and Coahuila ..... ***A. waterfallii***

- Plants caulescent, the stems always longer than leaves; Chihuahua, Coahuila and other states 56

56. Pod stipitate, stipe 0.4–7 mm long 57

- Pod sessile, never stipitate 62

57. Laeflets 10–37 mm long; calyx 7.3–10.5 mm long, its tube 4.7–9 mm long; banner 15.4–19 mm long; wings 12.4–19 mm long; keel 10.6–15.4 mm long; stipe 3.5–7.4 mm long; grasslands and gypsic soils; San Luis Potosí and Nuevo León ..... ***A. racemosus* var. *racemosus***

- Leaflets 2–13 mm long; calyx 2.2–7.2 mm long, its tube 1.6–3.2 mm long; banner 4.9–10.2 mm long; wings 4.4–10 mm long; keel 3.9–7.6 mm long; stipe 0.1–2.7 mm long; mountains of Sinaloa, Chihuahua, Coahuila, Durango and San Luis Potosí 58

58. Calyx 2.2–2.9 mm long; pod 4–8 mm long; endemic of Chihuahua ..... ***A. scalaris***
- Calyx 3.4–7.2 mm long (very rarely 2.9 mm long in San Luis Potosí, but, the pod longer than 8 mm long); pod 8.5–22 mm long; Sinaloa, Chihuahua, Coahuila, Durango and San Luis Potosí 59
59. Banner 2.2–2.5 mm wide; endemic from mountains of southwestern Chihuahua..... ***A. pilosior***
- Banner 3–6 mm wide; plants from Sinaloa, Chihuahua, Coahuila, Durango and San Luis Potosí 60
60. Banner 4.5–7 mm long; wings 6–7.9 mm long; stipe 0.1–0.5 mm long; pod 8.5–13 mm long; San Luis Potosí..... ***A.micranthus* var. *micranthus***

- Banner 6.3–10.2 mm long; wings 6.6–10 mm long; stipe 0.4–2.7 mm long; pod (11–)14–22 mm long; Coahuila, Chihuahua, Durango and Sinaloa 61
61. Flowers pink-purple, pink-purple to reddish-violet; stipe 1–2.7 mm long; endemic of Coahuila ..... ***A. carminis***
- Flowers white, whitish, the keel petals purple or pinkish; stipe 0.4–1.5 mm long; Chihuahua, Durango and Sinaloa .... ***A. ervoides***
62. Racemes 1–7 flowers (rarely up to 12 in *A. parvus*) 63
- Racemes with 8-many flowers, or if only 5 flowers, then the racemes 4.5–10 cm long..... 65
63. Plants annual, 25 cm or longer, not tufted nor compact radial growth; pod triquetrous, 2–3.6 mm wide; banner 4–6.7 mm long..... ***A. nuttallianus***
- Plants perennial, 20 cm long shorter, tufted or with compact radial growth; pod triquetrous; banner 7.4–9 mm long, if it shorter, then the pod trigonous (tiquetrous but inflated) and commonly wider, up to 4.5 mm 64
64. Banner 7.3–9 mm long; pod triquetrous, 8–19 × 2–3.6 mm, linear to liner-oblong, aereal, never humistrate; calyx 4–5.1 mm long ovules (12–)14–26; Durango, Nuevo León, Cacatecas, San Luis Potosí and Tamaulipas ..... ***A. parvus***
- Banner 4.4–5.4 mm long; pod trigonous (triquetrous but inflated), 6–11 × 3–4.5 mm, humistrate; calyx 2.6–3.6 mm long; ovules 2–17; Chihuahua, Coahuila, Durango, and Zacatecas..... ***A. quinqueflorus***
65. Stipules all connate, and constituing a sheath around to the stem´s circumference, the upper ones joined at the base or up to half of its length; Durango, San Lus Potosí and Zacatecas..... ***A. esperanzae***
- Stipules free or clasping, or if connate (basal ones), then the pod caducous and 5–15 x 2–3.5 mm, or if almost 3.8 mm wide, not longer than 11 mm 66
66. Calyx small, 2.4–3.6 mm long..... 67
- Calyx longer, 3.8–8.5 mm long, rarely shorter..... 68
67. Peduncles 1.5–4.5 cm long, racemes 0.5–1.6 cm long; flowers 7–22 per raceme; Coahuila, Nuevo León and Zacatecas, 2500–3650 m ..... ***A. purpusi***
- Peduncles (3–)6–12 cm long; racemes 3–18 cm long; flowers (10) 25–65 per raceme; Chihuahua to San Luis Potosí, at different elevations 69
68. Pod semi-ovate, 3.1–7.8 × 2–2.7 mm; racemes up to 18 cm long; leaflets up to 10.3 mm long; Aguascalientes, Chihuahua, Durango, Nuevo León and Zacatecas..... ***A. goldmanii***
- Pod linear-elliptic to lanceolate, 6–12 × 1.3–2 mm; racemes up to 8 cm long; leaflets up to 24 mm long; Chihuahua, Coahuila, Durango, Sinaloa and San Luis Potosí ..... ***A. vaccarum***
69. Ovules 6–8; racemes 0.5–2.5 cm long; endemic of Sonora ..... ***A. hypoxylus***
- Ovules (8–)11–26; racemes longer or if up to 2–2.5 cm long, then with more than 8 ovules; Sonora and other states 70
70. Banner 3.4–4.3 mm wide; keel claw 4.7–5.8 mm long; stems 22 cm long or shorter; leaflets 1–6.2 mm long; Chihuahua and Durango ..... ***A. pringlei***
- Banner (4–)5–9 mm wide; keel claw 1.9–4.4 mm long; stems 25 cm or longer; leaflets (5–)7–21 mm long; Chihuahua, Durango and other states 71
71. Racemes completely developed 0.2–2 cm long; mature pod 10–12 mm long; local species in Nuevo León and the border from Chihuahua and Sonora..... 72
- Racemes completely developed longer, 2.5–10 cm; mature pod 13–22 mm long, or if the racemes as short as 2 cm long, then, the mature pods longer than 12 mm long; species with wider distribution..... 73
72. Calyx teeth 1–1.5 mm long; endemic form Nuevo León ..... ***A. mario-sousae***
- Calyx teeth 1.6–2.3 mm long; endemic of the mountains at the Sonora-Chihuahua border..... ***A. martinii***
73. Calyx 3.2–4.8 mm long, the teeth 1–1.4 mm long; racemes up to 14 cm largo; flowers (15–)25–55 per raceme; keel 5.4–6.3 mm long; Sonora, Chihuahua, Coahuila, Durango, San Luis Potosí and Zacatecas ..... ***A. hartwegii***
- Calyx (4.8–)6–7 mm long, its teeth (1–4–)2.5–3 mm long; racemes up to 10 cm long; flowers 1–15, or if up to 25, then the keel 6.5–8.4 mm long..... 74
74. Keel claw 1.8–3 mm long; keel 4.5–6.6 mm long; trichomes of stems and foliage up to 1 mm long; Chihuahua, Coahuila and Nuevo León ..... ***A. emoryanus***
- Keel claw (3.1–)3.3–4.8 mm long; keel (6.5–)6.7–9 mm long; trichomes on stems and leaves up to 0.5 mm long; Chihuahua, Coahuila, Nuevo León, Durango, Sonora and Zacatecas..... 75
75. Calyx tube 3.2–3.8 mm long; banner up to12 mm long; pod 10–16 mm long; Chihuahua and Sonora..... ***A. nothoxys***
- Calyx tube (3.6–)4–4.9 mm long; banner 10–15 mm long; pod (13–)15–22 mm long; Coahuila, Nuevo León, Durango and Zacatecas ..... ***A. coahuilae***
76. Pod stipitate 77
- Pod sessile 83
77. Calyx 3.1–4.6 mm long; banner 5.5–7.4 mm long; wings 5–6.5 mm long; stipe tiny, 0.1 mm long, the pod almost sessile; Sonora and Peninsula of Baja California..... ***A. insularis***
- Calyx 5–8.7 mm long, sometimes less than 5 mm (4.1 mm long), if so, not in Sonora; banner (7.4–)8–17 mm long; wings 7.1–16.1 mm long; stipe 1 mm or longer; Sonora, Baja California and other states 78
78. Flowers 2–5 per raceme; endemic of San Luis Potosí ..... ***A. tioides***
- Flowers 7(rarely 5 in *A. coriaceus*)-50 per raceme; San Luis Potosí and other states..... 79

79. Banner 7.4–9.3 mm long; wings 5.8–6.3 mm long 80
- Banner 10–19 mm long; wings 8.5–13.3 mm long 81
80. Leaflets (15–)25–47 per leaf; stipules 1–2.5 mm long; endemic of Durango ..... ***A. pennellianus***
- Leaflets 11–23 per leaf; stipules (1.5–)2.8–6 mm long; Durango and San Luis Potosí ..... ***A. potosinus***
81. Stipe 5–17 mm long; pod inflate resembling a bladder; flowers green-white, cream-yellowish or white, with purple veins; Sonora ..... ***A. trichopodus***
- Stipe (0.1–)1–4 mm long; flowers purple, violet or pink-purple; not from Sonora 82

82. Stipe 0.1–1 mm long; racemes 15–80 mm long; wings 12–15.3 mm long; keel 10–13 mm long; pod erect, 12–24 mm long, ovate-elliptic; Chihuahua, Coahuila, Nuevo León, Tamaulipas, Durango, San Luis Potosí and Zacatecas ..... ***A. coriaceus***
- Stipe 2–4 mm long; racemes 1.5–10 mm long; wings 9–12.2 mm long; keel 7.3–8.5 mm long; pod deflexed, 13–15 mm long, oblong-elliptic to clavate-oblong; Coahuila and Nuevo León ..... ***A. legionensis***
83. Pod didymous, subglobose, retuse at both ends; Durango, Nuevo León, San Luis Potosí and Zacatecas ..... ***A. diphacus***
- Pod oblong-elliptic, clavate-ellipsoid, oblique lanceolate-elliptic, ovoid-ellipsoid, obovoid-ellipsoid, oblique-ovoid, ovoid-oblong, ovoid-elliptic, barely inflate resembling a bladder, but always with stiffy or leathery valves or the pod inflate resembling a bladder, never retuse at both ends; in the previously mentioned and other states 84
84. Plants acaulescent or the stems shorter than the largest leaves; pubescence 0.4–0.7 mm largo, the trichomes not spirally twisted; Sonora ..... ***A. tephrodes***
- Plants caulescent, the stems always longer than longest leaves, or if the stems shorter than leaves and inflorescences, the pubescence pilose and tomentose, with two types of trichomes, short, curly, entangled, and others longer spreading, ascending or forwardly appressed, straight to sinouous, but spirally twisted, 1–2 mm long; Sonora and other states 85
85. Plants densely pilose and tomentose, with two types of trichomes, short, curly, entangled, and others longer spreading, ascending or rarely appressed, straight to sinuous, but spirally twisted, 1–2 mm long 86
- Plants variably pubescent, the trichomes shorter, or if the pubescence of two types (short and long), the trichomes never spirally twisted 87
86. Stems erect and caulescent; peduncles erect when young and in maturity; flowers early deflexed in anthesis; pod persistent on pedicel and dehiscing in the racemes; Chihuahua and Sonora ..... ***A. longissimus***
- Stems prostrate or decumbent, generally shorter than leaves and inflorescences; peduncles erect when young, humistrate in fruit; flowers ascending in anthesis; pods humistrate, soon caducous when maturing ..... ***A. mollissimus***
87. Keel 10–16.2 mm long 88
- Keel 3.6–9.7 mm long 89
88. Peduncles up to 15 cm long; pod unilocular; ovules 20–31; basal stipules connate; Chihuahua, Coahuila, Tamaulipas, Durango, San Luis Potosí and Zacatecas ..... ***A. coriaceus***
- Peduncles up to 10 cm long; pod bilocular; ovules 10–23; basal stipules clasping and decurrent, not connate; Chihuahua and Sonora ..... ***A. lentiginosus***
89. Flowers 2–9 per raceme 90
- Flores 10-many per raceme 92
90. Calyx teeth 0.8–1.6 mm long; ovules 3–9; Sonora ..... ***A. aridus***
- Calyx teeth (1.7–)2–3.5 mm long; ovules 10–21; Sonora, San Luis Potosí and Zacatecas 91
91. Pod somewhat widened but no inflated resembling a bladder, incurved, lunate, ending in an evident beak, its valves fleshy or leathery; racemes 5–25 mm long; Sonora ..... ***A sabulonum***
- Pod inflated resembling a bladder, almost spherical, ending in an obsolete beak or almost absent, its valves papery; racemes 5–53 mm long; San Luis Potosí and Zacatecas ..... ***A. wootonii* var. *candollianus***
92. Pod oblong, elliptic to clavate-ellipsoid, never inflated like a bladder, 3.5–6 mm wide; Sonora ..... ***A. cobrensis* var. *maguirei***
- Pod inflated resembling a bladder, Sonora and other states 93
93. Banner 4.6–7.5 mm long; wings 4.1–7.6 mm long; keel 4.1–6.5 mm long; Sonora, Chihuahua, Durango, San Luis Potosí and Zacatecas 94
- Banner (7.2–)9.4–12.5 mm long; wings (6.6–)8–13.3 mm long; keel (6.2–)7.4–9.5 mm long; Sonora and Chihuahua 95
94. Flowers (7–)25–32 per raceme; pod 6–13 × 6–10 mm; ovules 8–11; north end of Chihuahua and Sonora ..... ***A. thurberi***
- Flowers (3–)5–15 per raceme; pod (10–)15–37 × (10–)12–20 mm; ovules (10–)13–21; Sonora, Chihuahua, Durango, San Luis Potosí and Zacatecas ..... ***A. wootonii***
95. Racemes (1.5–)3.5–12 cm long; banner 7.2–9.4 mm long; wings 6–8.3 mm largo, its blade 4.7–5.7 mm long; keel 6.2–7.5 mm long, its blade 3.8–4.5 mm long; pod (10–)16–20 mm wide; scrublands, grasslands, unknown of coastal sand dunes; Chihuahua and Sonora ..... ***A. allochrous***
- Racemes 2.5–6.5 cm long; banner 9.4–14.2 mm long; wings (8–)8.3–13.4 mm long, its blade (5–)6.8–10.1 mm long; keel (7.4–)8.2–10 mm largo, its blade 4.7–6.7 mm long; pod 6–11 mm wide; coastal dunes and inland dunes in the del Desierto de Altar; northwestern Sonora ..... ***A. magdalenae***
96. Pod triquetrous or trigonous, triangular in cross section, flattened or somewhat widened or inflated, but triquetrous 97
- Pod oblong-ellipsoid, clavate-oblong, lanceolate-elliptic, widened, wide-cylindric or inflated resembling a bladder, or peltate, never triquetrous 104
97. Pod stipitate 98
- Pod sessile 102
98. Calyx 7.3–10.5 mm long, its tube 4.7–9 mm long; banner 15.4–19 mm long; wings 12.4–19 mm long; keel 10.6–15.4 mm long; locally distributed in three isolated areas of Nuevo León, Zacatecas and San Luis Potosi ..... ***A. racemosus* var. *racemosus***
- Calyx 2.6–7.2 mm long, its tube 2.1–3.8 mm long; banner 5.3–11 mm long; wings 4.9–10.5 mm long; keel 4.4–8 mm long; Sonora, Chihuahua, Durango, Sinaloa and Nuevo León 99
99. Leaflets 23–45; peduncles commonly 9.5–22 cm long, rarely shorter; flowers (13–)45–75 per raceme; stipe 3–5.5 mm long;

Chihuahua and Sonora ..... ***A. longissimus***

- Leaflets 9–25; peduncles 2–9 cm long; flowers 5–40 per raceme; stipe 0.4–2 mm long; Sonora, Chihuahua, Durango, Sinaloa and Nuevo León 100

100. Stems erect, 40–130 cm tall; keel blade 4.4–4.9 mm long; stipe 1.5–2 mm long; Nuevo León ..... ***A. regiomontanus***

- Stems prostrate, decumbent or incurved-ascendent distally, 20–60 cm long; keel blade 3.1–4.2 mm long; stipe 0.4–2 mm long; Durango, Sinaloa and Chihuahua 101

101. Banner 5.1–5.3 × 3.3 mm; wings 4.9–5.2 mm largo; keel 5.1–5.3 mm long; stipe 0.5–0.9 mm long; pod 2.2–2.5 mm wide; Sonora, Sinaloa and Durango ..... ***A. sinaloae***

- Banner 6.2–10.2 × 3.4–6 mm; wings 6.6–9.9 mm long; keel 5.5–7.7 mm long; stipe (0.4–)0.5–2 mm long; pod 2–4 mm wide; Durango and Chihuahua ..... ***A. ervoides***

102. Longest racemes (4–)6–18 cm long; flowers (13–)20–65 per raceme; pod 3.1–7.8 × 1.8–2.7 mm; Chihuahua, Durango, Nuevo León, Zacatecas, and Aguascalientes ..... ***A. goldmanii***

- Longest racemes 1–4 cm long; flowers 1–7 per raceme; pod (6–)7–18 mm × 1.6–4.5 mm 103

103. Stems 30–45 cm long; racemes 8–20 mm long; wings (4–)4.8–6.3 mm long, its blade 4–4.5 mm long; keel 4–6 mm long; pod (7–)10–21 × 1.6–3.5 mm, curved; Sonora, Chihuahua, Coahuila, Nuevo León, Tamaulipas, Sinaloa, Durango, Zacatecas, Aguacalientes, and San Luis Potosí ..... ***A. nuttallianus***

- Stems up to 15 cm long; racemes 30–40 mm long; wings 4.2–4.6 mm long, its blade 3–3.3 mm long; keel 3.2–3.8 mm long; pod 6–11 × 3–4.5 mm straight; Chihuahua, Coahuila and Zacatecas ..... ***A. quinqueflorus***

104. Pod stipitate; stipe 2–17 mm; Sonora, Durango, San Luis Potosí and Zacatecas 105

- Pod sessile; Sonora, Chihuahua, Durango, San Luis Potosí and Zacatecas 107

105. Pod ovoid, inflate resembling a bladder, stipe 5–17 mm long; Sonora ..... ***A. trichopodus***

- Pod lanceolate, oblong to elliptic, not inflated not resmebling a bladder, stipe 2–4 mm largo; Durango, San Luis Potosí and Zacatecas 106

106. Leaflets (13–)23–29; racemes 1–9.3 cm long with (5–)12–35 flowers; banner 9–11.5 mm long; Durango and San Luis Potosí ..... ***A. strigulosus***

- Leaflets 9–17; racemes 10–18 cm long with 30–50 flowers; banner 7–9 mm long; Durango and Zacatecas ..... ***A. zacatecanus***

107. Peduncles (3–)9–10 cm long; racemes (1.5–)3.5–12 cm long; flowers (10–)15–30 per raceme; calyx tube 1.9–3.6 mm wide, its teeth 0.6–2.5 mm long; banner 7.2–9.4 mm long; wings 6.6–8.3 mm long; keel 6.2–7.5 mm long; pod ovoid to semi-elliptic, oblique if it seen if profile, the ventral suture straight or concave, less pronounced than the dorsal one, beak evident and easily differentiated from the body; Chihuahua and Sonora ..... ***A. allochrous***

- Peduncles 0.5–7 cm long; racemes 1–5 cm long; flowers (2–)5–15 per raceme; calyx tube 1.8–2.3 mm wide, its teeth 2–3.5 mm long; banner 4.6–7.5 mm long; wings 4.1–7.5 mm long; keel 4.1–6.4 mm long; pod ovoid to subglobose, when ovoid, its sides relatively symmetric if they are seen in profile, both sutures, ventral and dorsal, equally convex, beak absent o tiny, not evidently differentiated from the body; Sonora, Chihuahua, Durango, San Luis Potosí and Zacatecas ..... ***A. wootonii***

108. Stems prostrate, rooting at floral nodes; leaves petiolated, subtending vertical peduncles with respect to soil; mountains of Valle de México, Morelos, and Michoacán 109

- Stems creeping, diffuse, decumbent, prostrate or erect, not rooting in the floral nodes; leaves, except sometimes basal, subsessile; Valley of México and other states 110

109. Stipules 3–5.5 mm long; leaves up to 10 cm long; leaflets 17–26, 4–12 mm long; peduncles 2–7 cm long; mature racemes with 5–12 flowers; banner 11.5–13 (rarely up to 15) mm long; wings 11–12 mm long; most commonly 2900–3330 m alt; México City and State of México ..... ***A. harshbergeri***

- Stipules 7–12 mm long; leaves 10.5–30 cm long; leaflets 27–38, 18–28 mm long; peduncles (<10)20–27 cm long, rarely longer, if shorter than 10 cm, then the racemes with 20 or more flowers; mature racemes with 20–34 flowers; banner 14–15 mm long; wings 12.5–15 mm long; most commonly 2200–2400 m; México City, State of México and Michoacán ..... ***A. radicans***

110. Pubescence dolabriform, the trichomes joined in a point before the end, in the form of "v" or t"", with equal or most frequently with unequal arms ..... ***A. hypoleucus***

- Pubescence basifixed, trichomes simple 111

111. Petals all red; banner 24–33 mm long; endemic of the Cofre de Perote Mountian (Veracruz) ..... ***A. helleri***

- Petals of different color, or if red, then combined with another color; banner 17.5 mm long or shorter; Veracruz and other states 112

112. Pod strongly obcompressed, in the form of a car windshield, shield or wing in cross section; Guanajuato and Jalisco ..... ***A. scutaneus***

- Pod triquetrous, triangular in cross section, flattened or widened, linear-elliptic, lanceolate, ovate-acuminate, semi-ovate, linear-oblong, oblong-elliptic to oblong-obovate, ellipsoid, obovate, ovoid, or inflated resembling a bladder and subglobose, not in shield, or wing shaped in cross section; Jalisco and other states 113

113. Petals pink, rosaceous, purple, lavender, lilac, blue, cherry, violet, purple-reddish, bicolored (even the veins o some part of the petals) or white, but mixed with other color, but not green-whitish or green-yellowish 114

- Petals all white, cream, yellow, ochroleucous, concolors, if bicolored then green-whitish or green-yellow 132

114. Pod triquetrous, inflated-trigonous or trigonous 115

- Pod linear-elliptic to oblong-elliptic but laterally compressed, ellipsoid-flared or inflated, resembling a bladder 124

115. Pod stipitate 116

- Pod sessile 117

116. Stipe 0.4–2 mm long; leaflets 11–25; banner 6.2–10.2 × 3.4–6 mm; wings 6.6–9.9 mm long; keel 5.5–7.7 mm long; Nayarit, Jalisco and Michoacán ..... ***A. ervoides***

- Stipe up to 0.5 mm long; leaflets 17–31; banner 4.4–7 × 3.4–3.5 mm; wings 4.4–4.8 mm long; keel 3.9–4.6 mm long; Michoacán, México City, State of Mexico, Hidalgo, Veracruz, Morelos, Puebla and Oaxaca ..... ***A. micranthus***

117. Pod 3.1–6 mm long (rarely to 7.8 mm in Zacatecas); ovules 4–8; racemes 3–18 cm long ..... ***A. goldmanii***

- Pod (6–)8–19 mm long; ovules (8–)14–26, or if less than 8, then leaves with 11 or less leaflets or, the racemes only 5–10 mm long 118
118. Racemes (umbrella-like) 5–10 mm long; calyx 2.5–3 mm long, the tube 1.6–2 mm long; pod 7–8 mm long; endemic of Puebla (Esperanza 18°51’47’’N–97°22’35’’W) ..... ***A. pueblae***
- Racemes (10–)25–80 mm long, not umbrella-like, or if shorter, then the fruit longer; calyx 3.3–6.3 mm long, the tube 2–3.6 mm long; Puebla and other states 119
119. Leaflets 7–11 per leaf; calyx teeth 0.6–0.8 mm long; keel 3.2–5 mm long; Jalisco, Hidalgo and Puebla 120

- Leaflets 11–29 or if less than 11, then, the calyx teeth 1 mm long or longer; keel (5–)5.4–7.7 mm long; Jalisco, Michoacán, City, State of México, Hidalgo and Puebla 121
120. Stems commonly 20 cm long or longer; pod triquetrous, linear, 2 mm wide or narrower, never humistrate; calyx 3.7–5.4 mm long; calyx teeth 0.6–0.7 mm long; wing blade 4–4.3 mm long; keel 4–5 mm long; Hidalgo and Puebla ..... ***A. nuttallianus* var. *austrinus***
- Stems up to 15 cm long; pod trigonous, somewhat inflated, 3–4.5 mm wide, frequently humistrate wih age; calyx 2–3.6 mm long; calyx teeth 0.8–1.6 mm long; wing blade 3–3.3 mm long; keel 3.2–3.8. mm long; Hidalgo and Jalisco ..... ***A. quinqueflorus***
121. Banner 5.1–6.4 mm long; calyx tube 2–2.6 mm long; pod 5–9 mm long; ovules 8–14; City and State of México, Hidalgo and Jalisco ..... ***A. oxyrhynchus***
- Banner 7.4–9.4 mm long; calyx tube (2.2–)3–3.5 mm long; pod (8–)11–19 mm long; ovules (12–)14–26; Jalisco, Hidalgo, Michoacán, Guanajuato and Puebla 122
122. Largest racemes 40–140 mm long, flowers (15–)25–62 per raceme; calyx teeth 1–1.4 mm long; Guanajuato, Jalisco, Michoacán, Querétaro ..... ***A. hartwegii***
- Largest racemes 5–30 mm long, flowers (3–)5–25 per raceme; calyx teeth (1.4–)1.5–3 mm long; Hidalgo, Michoacán and Puebla 123
123. Stipules connate; peduncles (30–)100–140 mm long; flowers 10–25 per raceme; Hidalgo, Michoacán and Puebla ..... ***A. esperanzae***
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124. Pod sessile 125
- Pod stipitate 126
125. Leaflets (6–)12–26 mm long; peduncles (6–)7–21.5 cm long; calyx 9–13 mm long; banner 15–24.5 mm long; wings 14.5–20.5 mm long; pod 10–25 mm long; ovules 22–28; Jalisco, Guanajuato, Querétaro, Hidalgo, City and State of México, Puebla, Querétaro and Veracruz ..... ***A. mollissimus* var. *irolanus***
- Leaflets (4–)12–16 mm long; peduncles (3.5–)4–10.5 cm largo; calyx 3.2–4.6 mm long; banner 5.1–6.4 mm long; wings 5–6.6 mm long; pod 5–9 mm long; ovules 8–14; Jalisco, City and State of México, Hidalgo and Jalisco ..... ***A. oxyrhynchus***
126. Annual; calyx teeth 0.3–0.5 mm long; wing blade 4–4.1 mm long; pod 6–7 mm long; Morelos ..... ***A. sagitticarpus***
- Perennials; calyx teeth 0.7–4.2 mm long; wing blade 5–8 mm long; pod 10–23 mm long; Morelos and other states 127
127. Banner 6.7–7.8 mm long; wings 6.4–6.9 mm long; keel petals 4.8–5.6 mm long; Guanajuato, and Hidalgo ..... ***A. hidalgensis***
- Banner (7.4–)8.5–15.5 mm long; wings 7.1–13.2 mm long; keel petals 5.8–10.2 mm long; Hidalgo and other states 128
128. Banner 7.4–8.4 mm long; keel 5.8–6.3 mm long; Guanajuato ..... ***A. potosinus***
- Banner 8.5–15.5 mm long; keel 6.8–10.2 mm long; Guanajuato and other states 129
129. Leaflets 2–7 mm long; peduncles 5.5 cm long or shorter; flowers 3–21 per raceme; keel 8.8–10.2 mm long, its blade (4.1–)4.7–5.4 mm long; Michoacán, State of México and Veracruz ..... ***A. hintonii***
- Leaflets (3–)7–19 mm long; peduncles 5 cm long or longer; flowers (–6)15–30 per raceme; keel 6.8–8.4 mm long, its blade 4–4.6 mm long 130
130. Calyx 3.2–6 mm long; Jalisco, Michoacán, Guanajuato, State of México, Hidalgo, Puebla and Guerrero ..... ***A. guatemalensis* var. *brevidentatus***
- Calyx 6.5–7.5 mm long; City y State of México, Chiapas 131
131. Blade of the wing 1.4–2.4 mm wide; pod 10–15 mm × 4–6 mm; City and State of México; Hidalgo, Michoacán, and Morelos ..... ***A. tolucanus***
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132. Pod triquetrous o trigonous 133
- Pod linear-elliptic to oblong-elliptic but dorsoventrally compressed, ellipsoid-flared, tumescent or inflated resembling a bladder 139
133. Pod stipitate 134
- Pod sessile 136
134. Stipe 2.8–3.1 mm long; calyx tube (2.9)3.3–4.3 mm long, the teeth 2.3–3.8 mm long; keel 7.7–8.7 mm long, its claw 4–4.7 mm long; mountains of México City, State of México, and Morelos ..... ***A. lyonnetii***
- Stipe 0.4–1.5 mm long; calyx tube 2.1–3.8 mm long, the teeth 0.7–2.2 mm long, or if longer, then, the blade of the wing petals 3 mm wide or wider; keel 3.9–7.6 mm long, its claw 2–3.7 mm long; México City and other states 135
135. Banner 3–6 mm wide; pod linear-elliptic, 11–18 mm long, stipe (0.4–)0.6–2 mm long; Nayarit, Jalisco, Michoacán, and Tlaxcala ..... ***A. ervoides***
- Banner 3–3.5 mm wide; pod oblong-elliptic, (5.5–)8.5–13 mm largo, stipe 0.1–0.5 mm largo; Michocán, México City and State of México, Morelos, Hidalgo, Puebla, Veracruz y Oaxaca ..... ***A. micranthus***
136. Mature racemes 4–18 cm long; Guanajuato, Querétaro, and Jalisco ..... ***A. hartwegii***
- Mature racemes 0.2–2.5 cm long; Guanajuato, Hidalgo, Oaxaca and Puebla 137
137. Petals white (if bicolored, white with purple or pink tones); trichomes of stems and foliage 0.4–1.4 mm long; banner 4–7.3 mm long; Hidalgo and Puebla ..... ***A. nuttallianus***
- Petals yellow-greenish; trichomes of stems and foliage 0.2–0.5 mm long; banner 8–11.2 mm long; confined to local areas of

Guanajuato and Oaxaca 138
138. Most parts of stems subterranean; leaflets 9–15; peduncles 1–2.5 cm long; racemes up to 1 cm long with 7–10 flowers; banner 8–8.5 mm long; keel 6 mm long; pod 8–10 × 4–5.5 mm; ovules 18; Oaxaca ..... ***A. cenorrhynchus***
- Most parts (or all) of stems aereal; leaflets 15–27; peduncles 4–6 cm long; racemes 2–3 cm long with 12–18 flowers; banner 9–11 m long; keel 7–8 mm long; pod 10–13 × 2.5 mm; ovules 8; Guanajuato ..... ***A. guanajuatensis***
139. Pod sessile 140
- Pod stipitate 141

140. Calyx 4.2–6.5 mm long; banner 4.3–7.5 mm long; wings 4.1–7.5 mm long; keel 4.1–6.4 mm long; pod (10–)30–43 × (8–)12–22 mm, inflated resembling a bladder, valves papery; flowers 2–15 per raceme; State of México, Hidalgo and Veracruz ..... ***A. wootonii***
- Calyx 6.8–14 mm long; banner 15–24 mm long; wings 14.2–24.7 mm long; keel 11–14.6 mm long; pod 11–25 × 4–13 mm, flared o inflate but not resembling a bladder, its valves fleshy or leathery or rigid papery; flowers 7–45 per raceme; Jalisco, Guanajuato, Querétaro, City y State of México, Hidalgo, Puebla and Veracruz ..... ***A. mollissimus***
141. Leaflets up to 7 mm long or shorter; peduncles 5 cm or shorter; local species with two disjunct varieties, one in Michoacán and the other in Veracruz ..... ***A. hintonii***
- Leaflets commonly longer than 8 (up to 22 mm); peduncles 6 cm or longer 142
142. Larger leaflets up to 8 mm long; calyx 3.4–4.5 mm long, the tube 2.3–2.7 mm long; banner 6.7–7.8 mm largo; wings 6.4–6.9 mm long; keel 4.8–5.6 mm long; endemic of Hidalgo ..... ***A. hidalgensis***
- Leaflets larger than 8 mm long, up to 20 mm long; calyx (4–)5–7.8 mm long, the tube (2.6–)2.8–4 mm long; banner (7–)8.5–12 mm long; wings 7.7–10.5 mm long; keel 6.2–8.5 mm long; Hidalgo and other states 143
143. Racemes 9.5–18 cm long; banner 7–9 mm long; blade of the wing petals 1.5 mm wide; keel 6.2–7 mm long; Durango, Jalisco and Zacatecas ..... ***A. zacatecanus***
- Racemes 0.5–9 cm long; banner (8.5–)9.5–12 mm long; blade of the wing petals 1.8–2.8 mm wide; keel 6.7–8.3 mm long; Jalisco and other states, but not in Durango and Zacatecas 144
144. Pod oblong-elongate, 1.6–3.8 × 0.4–0.7 cm, almost 4 to 5 times longer than wide; Jalisco and Nayarit ..... ***A. jaliscensis***
- Pod wide oblong, shorter, but relatively borader, 1.2–2 × 0.4–0.8 cm; wider distributed 145
145. Plant erect; pod dorsally and basally dehiscent only; trichomes of stems and foliage 0.4–0.7 mm long; peduncles (4–)5–10 cm long; calyx tube 2.6–3.2 mm long; wing claw 3–3.5 mm long; keel 6.7–7.5 mm long; Jalisco, México City and State of México, Tlaxcala, Hidalgo, Puebla and Oaxaca ..... ***A. strigulosus***
- Plants diffuse or trailing; pod dorsally dehiscent in all its length, trichomes of stems and foliage 0.2–0.3 mm long; peduncles (3–) 15–26 cm long; calyx tube 2.6–4 mm long; wing claw 3.2–4.6 mm long; keel 6.8–8.3 mm long; Jalisco, Michoacán, Guanajuato, State of México, Morelos, Hidalgo, Puebla, Guerrero, Oaxaca and Chiapas ..... ***A. guatemalensis***

1. ***Astragalus acutirostris*** S. Watson, in Proc. Amer. Acad. Arts 20: 360–361. 1885

Type**:—**USA, "Near Brown's Ranch, Mohave Desert, *S.B. & W. F. Parish 1276*, May, 1882 (Holotype GH00058614 digital image!; isotypus, GH00058615 digital image!).

Oxytropis acutirostris (S. Watson) M. E. Jones, Proc. Calif. Acad. Sci. II, 5: 677. 1895.**—***Spiesia acutirostris* (S. Watson) M. E. Jones, Proc. Calif. Acad. Sci. ser. 2, 5: 677, in obs. 1895.**—***Aragallus acutirostris* (S. Watson) A. Heller, Cat. N. Amer. PI. 4. 1898**.—***Hamosa acutirostris* (S. Watson) Rydb., Bull. Torrey Bot. Club 54: 331.

Astragalus nuttallianus DC. Var. *acutirostris* (S. Watson) Jeps., Fl. Calif. 2: 379. 1936.

Annual. Stems up to 30 cm long, erect to decumbent or prostrate, pilose, strigose, trichomes incurved, ascending to appressed up to 0.6 mm long. **Stipules** semi-clasping, not connate, 0.8–3 mm long, triangular ovate to lanceolate, subglabrate, trichomes black and white mixed. **Leaves** 1–5 cm long, leaflets 7–15, 2–8.5 mm long, oblong to obovate, truncate or retuse apically, cinerous, bicolored, abaxially brighter. **Peduncles** 2–7 cm long, straight, rarely bent, surpassing the leaves; racemes 1–4.5 cm long, flowers 1–6. **Flowers** white with purple or white with lilac tones; calyx 2.6–4 mm long, the wings 4.3–6.2 × 1.1–1.6 mm, claw 1.2–2 mm long, the blade 3.3–4.6 mm long, apically oblique, oblanceolate; the keel 4.2–5.8 × 1.3–1.7 mm, the claw 1.4–2.2 mm long, the blade 3–3.8 mm long, sub-elliptic, apically ending in a acute beak, incurved. **Pod** 12–30 x 2–3 mm, stipitate, the stipe 0.3–0.8 mm long, the body straight, ascending or pendulous, linear-elliptic, triquetrous, curved, basally acute, apically abruptly contracted into a short beak or gradually narrowing to the apex, laterally compressed, valves thin, minute strigose or rarely glabrate, green or purple, turning dark brown with age, sublustrous, reticulate; septum complete, thence bilocular, forming two chambers, early caducous from receptacle; ovules 12–26; seeds 1.5–2.5 mm long, olive to dark brown, sometimes with purple tones, dull.

Distribution:—In Mexico, restricted to Baja California in the Sierra Juárez, La Rumorosa, El Rosario, San Quintín, Punta Prieta and Laguna Mormona. Also, in southern California and Nevada (USA) (Fig. 2).

Habitat:—Metamorphic and saline soils; rocky plains with gravel; deep streams; hillsides; common in conifer-oak-juniper forest; associations of pinyon-juniper-oak; 300–1375 m.

Comments:—Species quite similar to some varieties of *A. nuttallianus*, although the latter has sessile and persistent pods in the receptacle; similar also to *A. emoryanus*, but the latter has ovary and pod glabrous.

Specimens examined:—BAJA CALIFORNIA: 4 May 1973, east slope of Cerro Matomi, *Reid Moran 20795* (NY, SD); 19 April 1958, 16 km southeast of El Rosario, *P. H. Raven 12542* (CAS, NY); 16 May 1982, Sierra Juárez, 4 km SW of la Rumorosa, *R. Moran 30739* (ENCB, SD); 15 May 1977, Sierra Juárez, 5 km west of La Rumorosa, *R. Moran 24127* (CAS, SD);1 May 1966, Sierra San Borja, on east slope, west peak, Cerro Santa Marta, *R. Moran 13113* (SD); 2 April 1991, 22 mi NE of El Arco on road to San Francisquito *S. Boyd 5748, T. Ross* (MEXU).

2. ***Astragalus allochrous*** A. Gray, Proc. Amer. Acad. 13: 366. 1878

Type**:—**USA, Near Wickenburg, Arizona, *E. Palmer 588,* 1876 (Holotype: GH 00058622 digital image!; isotype: NY!).
Phaca allochroa (A. Gray) Rydb., Fl. Rocky Mts. 487: 1063. 1917.

Annual, or perennial for a short time. **Stems** up to 50 cm long, suberect to decumbent or when prostrate, the branches radiating from the center and forming a circle, frequently with purple tones at base, strigose, trichomes up to 0.7 mm long, adpressed. **Stipules** 1.4–7 mm long, triangular, ovate to triangular, acuminate, clasping, not connate, more evident in the lower nodes, surrounding the half or almost the complete stem´s circumference in upper nodes. **Leaves** 3–10 cm long, leaflets 9–21, 0.4–2.1 cm long, linear, oblong, elliptic to obovate or oblanceolate, acute, obtuse or retuse apically, occasionally mucronate, adaxially pubescent or glabrate. **Peduncles** 3–11 cm long, curved and ascendant, the external ones humistrate and ascending when fruit rippens; racemes 2–12 cm long, lax, flowers 10–30, ascendant at the beginning. **Flowers** pink, reddish to purple, white or whitish, becoming violet when dry, the banner white, purple veined, wings and keel purple; the calyx 3.6–5.6 × 1.9–3.6 mm, strigose, trichomes white or, black and white mixed, tube commonly campanulate, 2.4–3.5 mm long, the teeth 1–2.5 mm long, subulate to lanceolate, ventral pair the longer; banner 7–9.4 × 5–7.2 mm, ovate to spathulate; the wings 6.5–8.3 × 2.2–2.7 mm, claw 2.2–3.1 mm long, blade 4.5–4.7 mm long, oblique-obovate; the keel 6.2–7.5 × 2.1–2.6 mm, the claw 2.5–3.2 mm long, the bade 3.8–4.5 mm long, incurved, oblique-triangular. **Pod** 2–4.5 × 1–2 cm, sessile or minutely elevated on the receptacle, spread to pendulous, elliptic, obliquely-elliptic, inflated, bladder-like, with asymmetric margins, narrow at both ends, the apex ending in a 3–6 mm long beak, dorsal suture strongly convex, valves strigose, at times with purple tones, papyraceous, translucent, lustrous, ochre, transversely reticulated, septum absent, soon caducous; ovules 10–21; seeds 2.5–3.2 mm long, semicircular, brown, greenish-brown, sometimes mottled with purple.

Distribution:—In Mexico, distributed in the northwestern region, north (Nogales, Sáric, Ímuris, Magdalena, Benjamín Hill) and northeast (Cananea, Agua Prieta, Nacozari, Fronteras, Esqueda) Sonora, central (Chihuaua), western-central and northwest (Janos, Nuevo Casas Grandes, Cuauhtémoc) Chihuahua. Also, in Arizona and New Mexico (USA) (Fig. 2).

Habitat:—In granite, gravel, sandy, and occasionally in calcareous soils; stony and rocky slopes and streams; Sonoran desert scrub; desert plains with scrublands and sahuaro; desert scrubland with columnar cacti; grasslands with Josua tree and creosote bush; mesquite scrublands; grassland with mesquite and oaks, adjacent to marshes; lowlands with oaks and grasses; frequent roadside; roadside with burr sage; along marsh; 825–1450 m.

Comments:—This species is sympatric and morphologically similar to *A. wootoni*. Tthese two species can be differentiated by their pod shape, as *A. wootoni* has a symmetrical pod, the margins of the valves are equilateral seen in profile view, in addition, the pod lacks a peak, if present, this is minute.

Specimens examined:—CHIHUAHUA: 4 March 1977, 43 mi. sw of Palomas at minera Bismark turnoff, *N. D. Atwood 21592, J. Spencer* (NY); 9 April 1997, *E. Estrada 6897, C. Yen.* (CFNL) **SONORA**: 8 March 2003, Reservoir El Yeso, ca. 6.5 km southeast of Magdalena, north of SON 54 (to Curcurpe), *T. R. Van Devender 2003-154* (MEXU, NY); 4 April 2007, Arroyo Guadalupe, Rancho Guadalupe, Ejido Oquita Montenegro, ca. 37 km east of Agua Prieta, *A. L. Reina G. 2007-370, T.R. Van Devender, J. F. Wiens, J. Moore* (NY); 9 April 2003, 1.4 km south of Agua Prieta on Mex 17; Chihuahua desert scrub, *T. R Van Devender 2003-357, A. L. Reina, G. Anderson* (CAS, MEXU); 4 April 1963, Sonora. 2 miles W of Santa Ana, *Gentry 19892, Argüelles* (MEXU, US); 10 April 2003, Esqueda, *A. L. Reina G. 2003-413, T. Van Devender, C. Anderson* (USON); 8 April 2003, Reservoir El Yeso, Mpio. Magdalena, ca. 6.5 km SE of Magdalena, *T. R. Vand Devender 2003-154, A. L. Reina G.* (USON); 9 April 2003, 1 KM SOUTH OF Agua Prieta, on Mex. 17, *T. Van Devender 2003-357, A. L. Reina, G. Anderson* (USON); 11 May 1948, Durango, 5.3 mi. no. of Esqueda on road to Agua Prieta, *I Wiggins 11776* (MEXU).

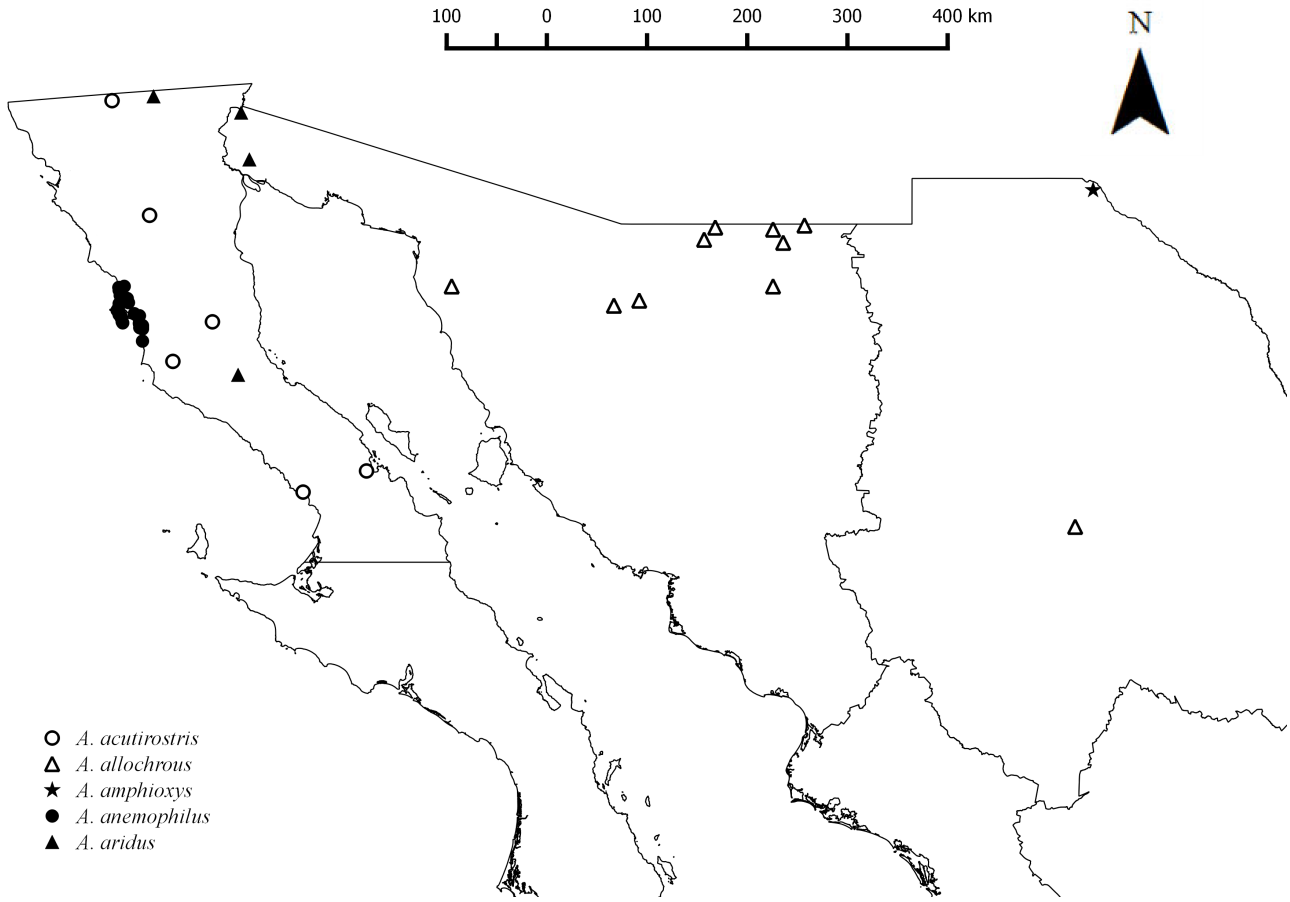

FIGURE 2. Map showing the distribution of *Astragalus acutirsotris, A. allochrous, A. amphioxys, A. anemophilus,* and *A. aridus* in Mexico.

3. *Astragalus amphioxys* A. Gray **var.** *amphioxys*

Type**:**—USA Not seen; lectotype (Designated by Rydberg 1925)**:**—USA, Doña Ana, New Mexico, *Thurber 295*, GH 02064315 digital image!

Astragalus amphioxys A. Gray, Proc. Amer. Acad. 13: 366. 1878.

Astragalus crescenticarpus E. Sheld., Minnesota Bot. Stud. 1: 148. 1894.

Xylophacos amphioxys (A. Gray) Rydb., Bull. Torrey Bot. Club 32: 662. 1905.

Xylophacos aragalloides Rydb, Bull. Torrey Bot. Club 34: 48. 1907.

Annual, or perennial for short time. **Stems** very short, up to 7 cm long, rarely 10–12 cm long, prostrate o barely ascending, strigose, the trichomes up to 1.5 mm long, dolabriform (joined at one point, before the base, forming a "t" with two arms of different or rarely equal size), sometimes mixed with shorter, straight, rigid, simple appressed trichomes. **Stipules** 1.5–13 mm long, semi-clasping or the lowest completely clasping, not connate, ovate to triangular-ovate. **Leaves** 2–13 cm long, leaflets 7–21, 0.3–2 cm long, elliptic, obovate to lanceloate-obovate, rarely retuse, pubescent. **Peduncles** up to 20 cm long, curved or humistrate as matures with age, glabrate or with scattered black trichomes; racemes up to 6.5 cm long, with same pubescence as peduncles, flowers 2–13. **Flowers** rose, rose-purple or white (immaculate), the calyx 9.3–14 × 3.2–4.7 mm, strigose, trichomes white, black or both mixed, the tube 5.6–10.5 mm long, cylindrical to campanulate-cylindrical, the teeth 1.5–4.7 mm long, subulate; the banner 16–24.5 × 8.2–12.2 mm, recurved, spathulate; the wings 15–22.4 × 2.4–4.2 mm, the claw 7–11.5 mm long, the blade 8.3–11.5 mm long, linear-lanceolate, incurved, apically obtuse; the keel 13.2–19.6 × 2.9–3.8 mm, obliquely obovate, the claw 6.5–11.9 mm long, the blade 6.8–9.8 mm long. **Pod** 1.5–5 × 0.5–1 cm, ascendant, but humistrate, straight or curved, laterally compressed, narrow in both ends, bisutured lenghtwise, the valves fleshy to leathery or almost lignified, reticulated or wrinkled, not inflexed; ovules 42–70; seeds 2–3 mm long, brown, dull or lustrous.

Distribution:—In Mexico, recorded only in the northern end of the state of Chihuahua (Municipio de Juárez), adjacent to the Texas border. Also, in Nevada, New Mexico, Utah and Arizona (USA) (v. 2).

Habitat:—Planis on sandy soils.

Comments:—Species easily discernible by its dolabriform pubescence.

Specimens examined:—CHIHUAHUA: 4 May 1885, Río Grande, Paso del Norte, *C. G. Pringle 201* (NY, US); 25 April 1893, Paso del Norte (today Cd. Juárez), *C.G. Pringle s.n* (MEXU).

4. *Astragalus anemophilus* Greene, Bull. Calif. Acad. Sci. 1: 186. 1885

Type**:—**MEXICO, "Cape San Quintin, Lower California, 10 May 1885, *E. L. Greene* (Holotype JEPS Specimen number UC82675; isotype NY!).

Astragalus crotalariae A. Gray var. *anemophilus* (Greene) M. E. Jones, Contrib. W. Bot. 10: 59. 1902.

Phaca vestita Benth., Bot. Voy. Sulphur [Bentham] 13. 1844**.—***Astragalus vestitus* (Benth.) S. Watson, Smithsonian Misc. Collect. 258:202. 1878. Bibliogr. Index N. Amer. Bot. 202. (non Boiss. & Heldr., 1849)**.—***Tragacantha vestita* (Benth.) Kuntze, Revis. Gen. Pl. 2: 949. 1891.

Perennial. Stems creeping, hard at the base, sprawling, decumbent or even suberect and its branches interlaced, up to 70 cm tall, with radial growth up to 2.5 m, in clumps, forming spots, tomentose or white tomentose, somewhat satiny or silky, the pubescence denser than leaflets, trichomes dense and soft, up to 0.6 mm long, occasionally mixed with longer scatered up to 1 mm trichomes. **Stipules** 2.2–8 mm long, clasping and connate, forming an erect sheath, triangular and apically acute. **Leaves** 3–9 cm long; leaflets 15–37, 2–14 mm long, elliptic, obovate, rarely suborbicular, obtuse or emarginate, decreasing in size distally in leaf, whitish to grayish-lead color. **Peduncles** 8–16 cm long, quickly bent down when the pods ripen; racemes 3–8 cm long, flowers 15–25. **Flowers** ochroleucous, cream-white, occasionally creamy but accompanied with lavender tones or becoming yellowish with age or even yellow-sulphur or white; the calyx, 6–6.6 × 3.5–4.1 mm, densely tomentose, the tube campanulate, 4.2–5.2 mm long, commonly with purple tones, the teeth 0.8–1.5 mm long, triangular to triangular-subulate; the banner 11.4–12.6 x 6.8–9 mm, recurved, rhombic-ovate to suborbicular; the wings 11.3–12.8 × 2.7–3 mm, the claw 5.2–6 mm long, the blade 5.4–5.8 mm long, oblong; the keel 10–11 × 2.7–3.3 mm, the claw 5–6.2 mm long, the blade 5.4–5.8 mm long, incurved. **Pod** spreading o slightly ascendant, 2.7–4 × 1.5–2.5 cm, sessile, inflated, bladder-like, ovoid to obliquately-ovoid, lightly but gradually narrowing at the base, beaked apically, valves without dorsoventrally evident sutures, opaque, not inflexed, green, sometimes with red, rose or purple tones, minutely tomentose, papery, finely reticulate; ovules 32–40; seeds 2.3–2.7 mm long, brown, smooth, opaque.

Distribution:—Endemic of northwestern Baja California, restricted to coastal dunes adjacent to the tidal zone, steep hills with sea view, vicinity of San Quintin, between 30°–31°N, from north of Camalú, Colonia Vicente Guerrero, Los Molinos, Campo San Ramón, Cabo San Quintín, Santa María to El Socorrito, El Socorro and Campo Costa Rica (Fig. 2).

Habitat:—Stable sand dunes with steep slopes; sand dunes bordering salt flats; dune slacks; sandy soil atop beach bluff, sandy dunes and lava crests; stabilized dunes atop sea cliff; hallophytic scrublands; areas with psamophilic plants and desert scrub; 10–80 m.

Comments:—Morphologically similar and sympatric with *A. harbisonii*, both species having connate stipules, but the latter with the petals with purple tones and smaller, sub-diaphanous pod. There is one individual (*A. Johnson 127*, 25 March 1973, SD), which apparently is a hybrid betwen *A. anemophilus* × *A. fastidius* (Rebman pers. com.).

Specimens examined:—BAJA CALIFORNIA: 10 April 1999, Bahia Santa María Area, 6.6 mi S of Junction of old and new Highway (Highway number 1) enter at Playa El Socorro, *S. I Morita 503* (CAS); 20 April 1975, coastal dunes 4 miles SE of Santa Maria *R. Moran 21802* (CAS); 13 July 1996, El Socorro, dunas costeras, *J. Delgadillo s.n.* (BCMEX); 7 May 1886, Northern Lower California, *C. R. Orcutt 1325* (NY); 10 April 1999, El Socorro sand dunes 22 miles south of San Quintín 6.6 miles south of junciton of old and new highways (Hwy 1), enter at Playa del Socorro, Bahia Santa Maria area, *S. I. Morita 503* (CAS, SD); 10 May 1885, Cape San Quintin, *E. L. Greene s/n* (CAS, JEPS, NY); 5 April 1973, North end of 7 mile stretch of coastal sand dunes bordering salt flat known as "Laguna Mormona" extending north from the town of San Quintin, *A. F. Johnson s.n.* (NY); 10 February1980, Common in dune slack, El Consuelo, *R. Moran 28063* (CAS, ENCB, MEXU, SD, TEX-LL, US)*, 28064* (CAS); 8 April 1936, Lower California, San Quintin, *C. Epling, WM. Stewart s/n* (CAS, JEPS, NY); 22 February 1982, Beach bluff west of San Quintín, *R. Moran 25355* (CAS); 20 April 1975, 4 miles SE of Santa María, *R. Moran 21802* (CAS, ENCB, NY, SD, TEX-LL,

US); 1 April 1985, Playas de San Quintin, 2–4 km N of playa, *R. F. Thorne 58924* (MEXU, NY); 20 November 1963, Playa Ramon 4 miles west of Colonia Guererro, *E. R. Blakley 6297* (CAS); 28 November 1963, Playa Ramon 4 miles west of Colonia Guererro, *E. R. Blakley 6298* (CAS); 21 April 1975, Ca. 5 miles NW of San Quintín, *R. Moran 21840* (MEXU, NY, SD); 17 April 1958, 20.6 km south of road to San Quintin, *P. H. Raven 12418, M. Mathias* and *J. Turner* (CAS); 1 January 2000, Camalú, on coast about 2 km southwest of town, about 27 km north-northwest of San Quintín, *M. Fishbein 4126, S. McMahon, K. Hooper, M. Hedin, M. Lowder* (NY); 10 August 1933, Hamilton Ranch (Peña Colorado) on banks of Rio Santo Domingo 14 miles north of San Quintin, *N. S. Cooper 57* (CAS); 1 April 1985, Playas de San Quintin, 2–4 km N of playas, *R. F. Thorne 58924, D. Charlton* (CAS); *10 January 1960,* Ca. 10 miles SE of San Quintín and 2 miles inland, *D. M. Porter 151* (CAS, MEXU); 12 April 1941, Socorro*, F. P Cronemiller 3026* (CAS); 17 April 1948, West of San Quintin Bay, *I. L. Wiggins 11884* (CAS, US); 14 October 1946, 1 mile south of Socorro, *I. L. Wiggins 11282* (CAS); 16 December 1953, Colonia Guerrero, *Harbison, Higgins* s/n (CAS, SD); 17 April 1958, Playa Ramon 4 miles west of Colonia Guererro, *P. H. Raven, M. Mathias, J. Turner 12418* (CAS7 July 1980, On inner beach dunes, north end of Laguna Mormona, west of Los Molinos, *R. Moran 29022* (CAS, SD, TEX-LL); 26 September 1978, 2.0 km southeast of El Pabellón, *R. Moran 26327* (CAS, SD); 23 April 1989, San Quintin, western sandspit, *P. Flanagan s.n* (CAS, SD); 13 July 1996, El Socorro, dunas costeras, *J. Delgadillo s.n.* (SD); 21 February 2001, Cabo San Quintin, 29 km SSW of Lazaro Cardenas; sand dunes, *M. A. Baker 13883* (SD); 27 November 1997, Costa Brava, ca. 4.7 km west Vicente Guerrero north of the mouth of the Rio Santa Domingo., *S. E. Eliason, F. M. Roberts 4901, C. A. Roberts* (SD); 18 March 2005, Greater San Quintin. Punta Mazo, at the end of the beach on the peninsula., *S. Vanderplank 050318-77, B. Lesch* (SD).

5. ***Astragalus aridus*** A. Gray, Proc. Amer. Acad. Arts 6: 223. 1864

Type**:—**USA, Interior Californian Desert, on the route between the mouth of the Gila River and San Diego, *Thurber 3220* (Holotype: GH digital image 00058652 GH!).

Tragacantha arida (A. Gray) Kuntze, Revis. Gen. 943. 1891**.—***Phaca arida* (A. Gray) Rydb., N. Amer. Fl. 24: 354. 1929.

Astragalus albatus E. Sheld., Minnesota Bot. Stud. 1: 128. 1894.

Annual, short lived. **Stems** 1-few, up to 30 cm long, decumbent to ascendant distally or sometimes creeping, ashen, silver to white strigose to strigose-pilose, trichomes 0.5–1.1 mm long, of two sizes, some short and appressed, mixed with straight and longer ones. **Stipules** 1.5–6.3 mm long, semi-clasping, not connate, scarcely decurrent, triangular, acuminate, frequently purple. **Leaves** 2–9 cm long, leaflets 7–17, 4–16 mm long, elliptic, oblanceolate, obtuse, truncate or retuse, equally satiny or canescent on both surfaces. **Peduncles** 2–5.6 cm long, ascendant, or slightly curved, ashen strigose; racemes 1.5–5.5 cm long, flowers 3–9, loose. **Flowers**, white with rose or lilac tones, white tinged with levender, purple, becoming tan when dry; the calyx 3.2–4.4 × 1.5–2.4 mm, papery, campanulate, densely pilose, trichomes white and few black ones mixed, the tube 2–2.7 mm long, the teeth 1–1.6 mm long, triangular to subulate; the banner recurved, 3.3–6.5 × 2.5–3.9 mm, elliptic, retuse; the wings 3.5–4.6 × 1–1.6 mm, the claw 1.4–2.3 mm long, the blade, 2.1–3.7 mm long, oblanceolate; the keel 3–6.5 × 1.4–2 mm, the claw 1.4–2.5 mm long, the blade 2.1–3 mm long, obovate. **Pod** ascending, sessile, lunate to elliptic in profile view, 10–18 × 4.4–7 mm, somewhat inflated but laterally compressed at both ends, beak compressed, sutures narrow, the dorsal one convex, the ventral one strongly concave, the valves strigulose-pilose, similar color as leaflets, papery, opaque, scarcely evident reticles; seeds, 2.6–3.6 mm long, ochre to brown-reddish, opaque, frequently purple stained.

Distribution:—Northeastern Baja California (Mexicali), northwestern Sonora (San Luis Río Colorado), near the border of both states (Fig. 5). Also in California and Arizona (USA) (Fig. 2).

Habitat:—Sandy plateaus, sandy desert wash; granitic soils; microphyllous desert scrubland; 640 m. Rare.

Comments:—Species morphologically similar to *A. comonduensis*, but this later species has longer erect, non-decumbent or trailing and longer stems, reaching up to 42 cm, shorter (0.2–0.5 mm long) and non silky or satiny-canescent pubescence. The leaflets of *A. comonduensis* are mucronate and adaxially glabrate versus equally pubescent on both leaf surfaces and not apically mucronatefor *A. aridus*. The color and length of the flower component of both species is different also, *A. comonduensis* has shorter (2–2.8 mm long) and narrower calyx, with white and black intermixed trichomes unlike the uniformly white trichomes of *A. aridus. Astragalus comonduensis* has purple-lavender petals, and its keel has a very distinctive small curved backward beak, absent in *A. aridus*. Carpologically, the pods of *A. comonduensis* are completely inflated, bladdery, proportionally wider, shiny, and not laterally compressed (not even a little), opaque to sub-diaphanous, and minutely-strigulose.

Specimens examined:—BAJA CALIFORNIA: 21 April 1915, Plain of San. [illegible], *D. T. MacDougal 227* (NY); 16 March 1960, Sandy desert wash along highway about 14 miles west of Mexicali, *I. Wiggins, D. B. Wiggins 15743* (CAS, MEXU, TEX-LL, US). **SONORA:** 26 February1958, Along Mexican Highway 2, 31 miles south-east of San Luis Rio Colorado, *P. H. Raven 11642a* (CAS, NY); 3 January 1904, Mesa near La Grulla, *D. T. McDougal s.n.* (NY).

6. ***Astragalus arizonicus*** A. Gray, Proc. Amer. Acad. Arts 7: 398. 1868

Type**:—**USA, "Arizona, near Camp Grant, Pinal County, April, *Edward Palmer 53* (holotype: GH digital image 00058653!; isotype MO 022482!)

Tragacantha arizonica (A. Gray) Kuntze, Rev. Gen. 943. 1891**.—***Hamosa arizonica* (A. Gray) Rydb., Bull. Torrey Bot. Club 54: 22. 1927.

Perennial but of short duration or **annual. Stems** thin, prostrate or decumbent, distally ascendant, up to 50 cm long, strigose to canescent, the trichomes dolabriform (joined at one point, before the base, forming a "t" with the arms of equal or different size). **Stipules** 2–4.5 mm long, semi-clasping, not connate, papery, triangular. **Leaves** 2–10 cm long; leaflets 5–17, 1.2–25 mm long, linear, oblong to ovate, mucronate. **Peduncles** 1–15 cm long, straight or curved, humistrate with age, the racemes 1.3–10 cm long, flowers 7–30. **Flowers** rose, lavender, blue, blue with white center, purple, white with pink, rose-purple to white, even greenish-buff with maroon lines, the banner with blue margins, sometimes red-violet veined, keel apex with blue-violet tones, sometimes fading indigo blue; the calyx 4.5–7 × 2–3.1 mm, minute strigose, the tube campanulate or cylindric, 3.2–4.1 mm long, the teeth 1.2–3 mm long, lanceolate to triangular; the banner 8–12 × 6–9.1 mm, recurved, obovate to suborbicular, scarcely retuse; the wings 6.7–10 × 1.7–2.5 mm, oblanceolate, the claw 2.4–4.3 mm long, the blade 4.7–6.5 mm long; the keel 8–10.4 × 2.2–2.7 mm, strongly incurved, the claw, 2.6–4.4 mm long, the blade 4.6–6.5 mm long. **Pod** 15–30 × 2.2–4 mm, ascendant, straight, linear-oblong, laterally compressed, narrow at both ends, triquetrous (triangular in cross-section), ventrally carinate, laterally convex, grooved or flattened longitudinally dorsally, the valves thin, densely appressed, tiny strigose, papery, tan, purple to brown-purple, reticulate, with a internal complete septum or almost so; ovuels 13–22; seeds 4-angular, mitten-shapped, 1.8–3 mm long, brown, light-brown or light-green, sometimes with purple tones.

Distribution:—In Mexico recorded only at northern Sonora (Santa Cruz, Caborca, Pitiquito, Santa Ana, Magdalena Quino, Cucurpe, Santa Cruz, Imuris and Benajmín Hill), also in Arizona (USA) (Fig. 3).

Habitat:—Frequent on clay soils, rocky slopes, disturbed sites, roadsides, roadbanks; grasslands; mesquite areas; mountain slopes; stony slopes; grassy hills; lovegrass-mezquite; desert grassland; desert scrub with creosote bush, Yoshua tree, mesquite, prickle pear, oaks and juniper; forests associated with Yosua tree and *Fouquieria*, sometimes in bushes along roads; Yosua tree-ocotillo-oak-juniper association; riparian association; Sonoran desertscrub; next to river; 800–1000 m.

Comments:—Two other species with dolabriform pubescence distributes in that area, they are *A. humistratus* var. *sonorae* (with connated stipules and curved fruits) and *A. amphioxys* (calyx and petals larger and also with wider pods).

Specimens examined:—SONORA: 7 April 2010, Rancho El Aribabi, Mpio. Ímuris, cañón El Cajoncito en la intersección con el Río Cocóspera, D. A. Delgado; 9 April 1977, 17.2 miles south-southeast of Magdalena; palm canyon in Cerro Cinta de Plata (Sierra Babiso), *T. R. Van Devender 3048, M. C. Kearns, K. L. Cole* (NY); 8 March 2003, Reservoir El Yeso, ca. 6.5 km southeast of Magdalena, north of SON 54 (to Curcurpe), *T. R. Van Devender 2003-155, A. L. Reina G.* (MEXU, NY, USON); 28 March 1970, Ca. 5 mi from Magdalena along road to Cucurpe, *L. McGill 6487, D. J. Pinkava, E. Lehto* (NY); 4 May 1932, 15 mi. N Magdalena, *F. R. Fosberg 7711* (CAS, NY); 14 April 1970, 4 mi NE of Magdalena on Hwy 15, *Wm. F. Mahler 6086, J. W. Thieret* (NY); 8–9 April 1977, 17.2 miles south-southeast of Magdalena; palm canyon in Cerro Cinta de Plata (Sierra Babiso), *T. R. Van Devender s/n* (NY, TEX-LL), 21 April 1973, 17.2 mi. S. of Magdalena on road to Cucurpe, *R. & M Spellenberg 3048. M. Spellenberg* (NY); 22 March 1934, Nine miles north of Magdalena on Hermosillo, Nogales Highway, *R. S. Ferris 8789* (CAS, NY, US); 24 March 1934*,* Nine miles north of Magdalena on Hermosillo, Nogales Highway, *R. S. Ferris 8798* (NY); 5 May 1932; 8 March 1936, District of Altar, 7 mi. S. of Sasabe, *D. D. Keck 3972* (CAS, US); 8 March 2003, , Reservoir El Yeso, ca. 6.5 km southeast of Magdalena, north of SON 54 (to Curcurpe), *T. R. Van Devender 2003-144, A. L. Reina G.* (NY); 24 April 2005, 9.4 km west-northwest of Rancho El Diamante, 2.6 km from Rancho Esmeralda (=Rancho Las Borregas), Sierra Las Avispas, *A. L. Reina 2005-685, T. R. Van Devender, M. Schieber* and *M. Klotz* (NY); 10 April 1998, Imuris, 9.2 km north of turn off to Magdalena on Mex. 15, *A. L. Reina G. 98-425, T. R. Van Devender* (MEXU, USON); 11

May 2006, Rancho El Aribabi, cruce del río Cocóspera, a 200 m al sur de la casa del rancho, *J. J. Sánchez E. 06-046, E. Gómez L., E. Fernández* (USON); 6 May 2005, Chula Vista ca. 35 km by air west of El Sásabe, *A. L. Reina G. 2005-808, T. R. Van Devender, A. Flesch, S. Jacobs* (USON).

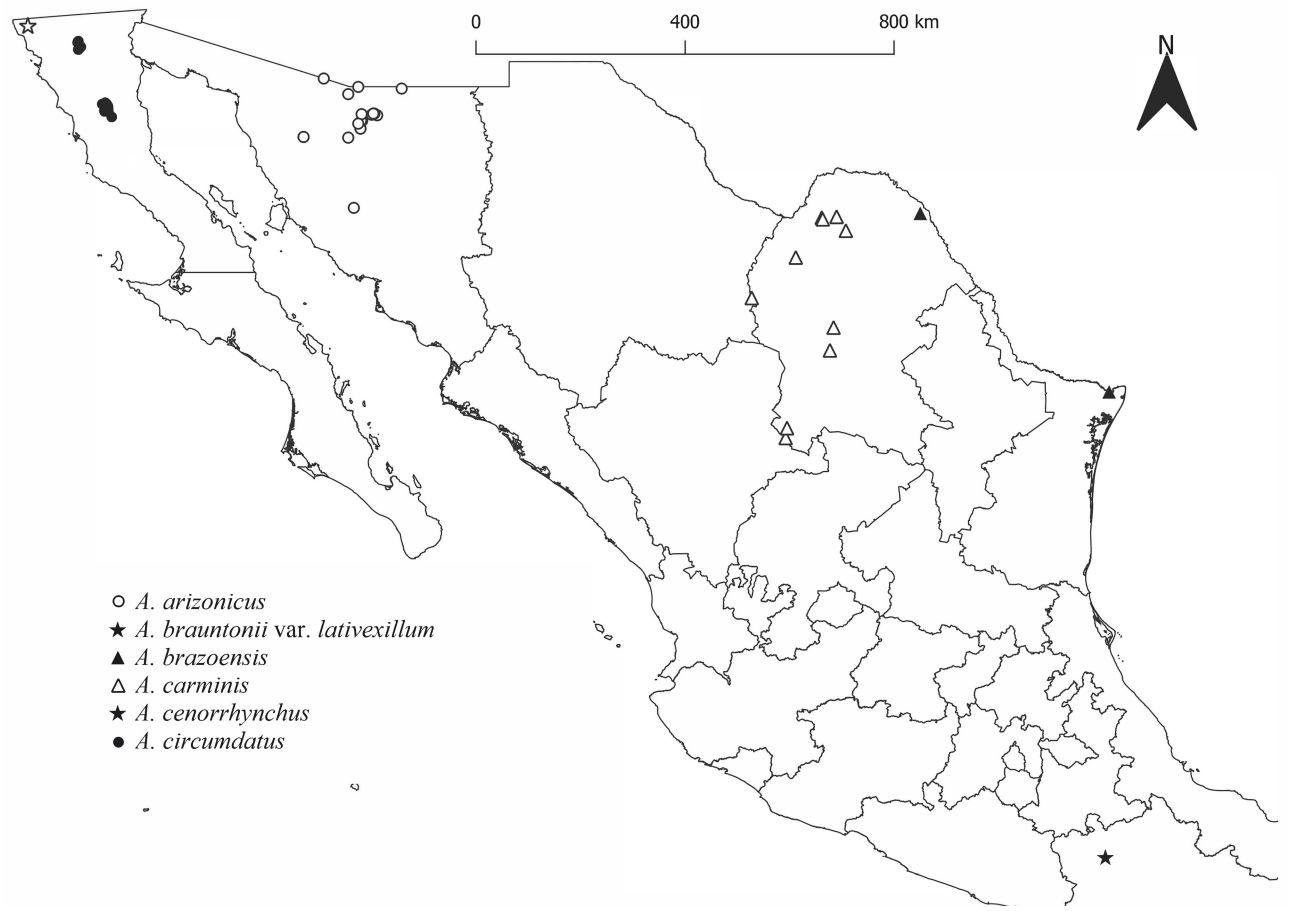

FIGURE 3. Map showing the distribution of *Astragalus arizonicus*, *A. brauntonii* var. *lativexillum*, *A. brazoensis*, *A. carminis*, *A. cenorrhynchus*, and *A. circumdatus* in Mexico.

7. *Astragalus brauntonii* Parish var. *lativexillum* A. E. Estrada, Rebman, C. González & Villarreal, Phytotaxa 577(1): 1–13. 2022

Type:—MEXICO. Baja California, Municipio de Tijuana, 7 June 2022, *C. González 106* (Holotype SD!; isotype MEXU!).

Perennial, herbaceous, caulescent, perennial with taproot. **Stems** several, hardened at base, straight, fistulated, striate, erect or ascending, up to 1.5 m tall, densely villose to tomentulose, the trichomes, 1–1.7 mm long, entangled, white. **Stipules** 2.8–3 mm long, subulate to linear, abruptly widened at base, amplexicaul, decurrent, dorsally pubescent, embracing up to one-half the circumference of the stem. **Leaves** 5–15 cm long, gradually decreasing in size from base to apex, leaflets 25–33 per leaf, 3–20 mm long, ovate, narrow elliptic to elliptic-obovate, acute to obtuse at apex, greenish to canescent, somewhat folded or flat, carinate adaxially by the midrib. **Peduncles** single or several at the top of the stems, closely spaced, 0.7–1.5 cm, always shorter than leaf, 2–9 cm long, straight to incurved, pubescent as stem, recemes 2–14 cm long in fruit, (23–)35–60 flowers. **Flowers** purple to pink-purple, dull, the calyx campanulate, 6.1–8.1 × 3–3.8 mm, the tube 3–4.1 mm long, the teeth 2.4–6 mm long, membranous or papyraceous, villous with white trichomes or with white, black and fuscous ones mixed, or only with ones in the tube and fuscous ones at the teeth; the banner 9–11.7 × 4.5–7.5 mm, subentire to retuse, obovate, the wings 7.2–10.2 × 2–3 mm, elliptic-obovate, the claw 3.2–4.6 mm long, the blade 5.5–6.6. mm long, slightly incurved, narrow oblong-oblanceolate, auriculate; the keel 6.3–8.5 × 2.2–2.5 mm, the claw 3.3–4.3 mm long, the blade 3.7–4.5 mm, semi-obovate, incurved, apex rounded, auriculate. **Pod** deflexed, 6.4–9 × 2.5–4 mm, caducous, sessile or upon a thinly gynophore 0.7 mm long or shorter, the body oblong to ovate-oblong, plumply, obtuse to cordate at base, apically acute in a incurved to subulate 1–1.5 mm

long beak, openly triquetrous, ventrally keeled by the suture, the dorsal suture deeply grooved, the lateral faces widely rounded, the valves green, light-brown to stramineous, thinly fleshy, somewhat coriaceous to stiffly papery, villous to tomentose, perpendiculary reticulated below pubescence; septum 1–1.3 mm wide; seeds 1.2–2.2 mm long, brown to dark-brown, shallow wrinkled.

Distribution:—Only known from the type locality, at the south of the city of Tijuana, Baja California (Fig. 3), coexisting with *A. tijuanensis.*

Habitat:—In disturbed and burned area, with arid shrublands as the main vegetation, inhabiting clayish coils, in hillsides, slopes and flats.

Comments:—Easily recognized by erect habit and congested infrutescences with oblong to ovate-oblong and less than 1 cm long fruits.

Specimens examined:—**BAJA CALIFRONIA:** 7 June 2022, Mpio. Tijuana, *C. González 106* (Holotype MEXU!; isotype SD!).

8. ***Astragalus brazoensis*** Buckl., Proc. Philad. Acad. Arts 454. 1861

Type**:—**USA "Western Texas." June 1861, *S. Botsford W.* (holotype: PH 00005241 digital image!; isotypus: GH 00058649 digital image!).

Tragacantha brazoensis (Buckl.) Kuntze, Rev. Gen. 943. 1891**.—***Hesperastragalus brazoensis* (Buckl.) Rydb., Bull. Torrey Bot. Club 53: 166. 1926.

Annual. Stems few, up to 45 cm long, commonly shorter, decumbent, erect and to ascending distally, strigulose, the trichomes appressed or ascendant, up to 0.7 mm long. **Stipules** 1.5–4.5 mm long, semi-clasping or the lowest ones, almost completely clasping, not connate, ovate. **Leaves** 2–8 cm long; leaflets 11–13, 3–13 mm long, oblong-obovte to spathulate, retuse. **Peduncles** 3–11 cm long, straight and ascendant or curved; the racemes 1–3.5 cm long, flowers 7–25, deflexed with age. **Flowers** purple with white tones, whithish or bicolored, with lilac tones at the apical edges; the calyx campanulate, 2.7–4.1 × 1.6–2 mm, strigulose, with white and black trichomes mixed, the tube 1.5–2.5 mm long, purple or green, the teeth subulate, 1–1.8 mm long; the banner 5.3–8 × 3.6–5.6 mm, recurved, with lilac or purple tones on the edge, obovate, retuse; the wings 3.8–5.6 × 1.3–2.7 mm, oblancolate, the claw 1.6–2.3 mm long, the blade 3.8–5.6 mm long; the keel 4.5–5.9 × 0.8–2.1 mm, oblong-obovate, the claw 2–2.6 mm long, the blade 3–4 mm long. **Pod** pendulose, elevated in a glabrate gynophore 1.5–2.3 mm long, peltate, somewhat semicircular, dorsoventrally compressed, but somewhat inflate, on times wider than longer, 3.5–7 × 4.5–9 mm, retuse at both ends, with a conic, triangular-subulate apex 0.7–1 mm long, the valves hard, papery but stiff, glabrate, green, turning purple with age, brown or ochre, somewhat lustorous, with a complete septum, thence bilocular; ovules 4; seeds 2.2–3.2 mm long, brown to olive smooth.

Distribution:—Northeastern Mexico, extreme north of the state of Tamaulipas (Municipality of Matamoros) and Llano del [illegible..tijon ?], *R. Runyon 833* (US); one record from Coahuila (Muncipality of Jiménez). Also, in Texas into the USA (Fig. 3).

Habitat:—Inhabiting desert scrub and disturbed areas associated with weeds.

Comments:—Easily recognized by its peltiform shield-shaped, elevated pod. The other species with similar fruit shape is *A. scutaneus* (western Jalisco and San Luis Potosí), but, this later with sessile and strigose pods.

Specimens examined:—**COAHUILA:** 11 March 1991, Mpio. Jiménez, *R. Solís s.n.* (ANSM); **TAMAULIPAS**: 10 April 1905, Matamoros, *S. M. Tracy 9091* (NY, US); 21 March 1876, Tamaulipas (perhaps Matamoros) *R. Runyon 833* (US).

9. ***Astragalus carminis*** Barneby, Leafl. West Bot. 7: 37. 1953

Type**:—**Mexico, Coahuila, Cañon de Sentenela on Hacienda Piedra Blanca, Municipio de Villa Acuña, 6 July 1936, *F. Lyle Wynd & C. H. Mueller 556* (holotype: US 0004028 digital image!; isotype: ARIZ 0216e666-40a2-4290-9085-b73ff94cbc2c, GH 00059408 digital image!, MO, NY 00005790 digital image!).

Perennial. Stems weak, up to 50 cm long, ascendant, decumbent or creeping, sometimes forming dense clumps 0.6 dm diameter, strigose, the trichomes 0.25–0.5 mm long, appressed, straight. **Stipules** 1.5–5 mm long, deltoid, semi-

clasping, sometimes embracing only half the circumference of the stem, not connate. **Leaves** 3–10 cm long; leaflets 13–27, 2–12 mm long, oblong-obovate to obovate, emarginate or truncate, somewhat distant among them, bicolored, glabrate adaxially, pubescent abaxially. **Peduncles** 4–9 cm long, straight and erect, somewhat curved with age; racemes 1–8 cm long, flowers 4–20. **Flowers** rose, rose-purple, purple, or flowers purple and blue in the same inflorescence, to reddish-violet; the calyx wide campanulate, 4.4–5.8 × 2–2.6 mm, membranous, the the tube 1.6–3 mm long, reddish, commonly with black and white trichomes mixed, the teeth 1.6–4 mm long, subulate; the banner 7.6–10 × 4.5–6 mm, recurved, obovate, retuse; the wings 7.6–10 × 1.5–2 mm, linear-oblong to linear-elliptic, the claw 2.3–3 mm long, the blade 6.4–8 mm long; the keel incurved, 6.3–7.5 × 2.2–2.5 mm, the claw 2.3–3 mm long, the blade 4–4.7 mm long. **Pod** deflexed or spreading, stipitate (the stipe 1–2.7 mm long), linear-oblong, curvate or falcate, 12–22 × 2.5–3.5 mm, narrow at both ends, triquetrous, compressed, dorsally sulcate, ventrally carinate, the valves glabrate, papery, ochre, turning brown to black with age, reticulate, septum complete, the pod thence bilocular; ovules 12–16; seeds 2–2.5 mm long, brown, smooth.

Distribution:—Endemic to Mexico, central mountains (Sierra La Madera, NW of Cuatro Ciénegas) and northern mountains (Maderas del Carmen, Sierra El Pino, and Cerro El Centinela) of Coahuila (Fig. 3).

Habitat:—Sandy soils derived from igneous rock; deep and humid canyons and riparian areas; roadsides; scrublands; chaparral communities; elm-oak; maple, cypresss, juniper, pine, douglas fir, and oak forest; roadside; conifer-oak association; 700–2800 m.

Comments:—Physiognomically similar to *A. greggii*, but easily recognizable, the latter having stems and with abundant retrorse or straight pubescence and the flowers on average, half as long as *A. carminis*.

Specimens examined:—COAHUILA: 20 August 1994, Sierra Madera del Carmen, Rancho EL Secadero, cañón Poblano, *M. A. Carranza 2045, 2050, J. Encina, J. García M.* (ANSM); 29 May 1992, Rancho Florida, aprox. 100 km al NW de Múzquiz, rumbo a Boquillas del Carmen, carr. 53, *M. A. Carranza 1579, J. Noriega, L. García* (ANSM, TEX-LL); 6 July 1936, Rancho Agua Dulce, canyon on the eastern slope of the Sierra de San Manuel, *F. L. Wynd 556* (NY); 16 June 1956, Sierra Madera Mountains, four miles west and ten miles south of Ocampo, *J. Graber 181* (NY, TEX-LL); 23 June 1976, Cañon de la Hacienda, Sierra de la Madera, NW of Cuatro Cienagas, *McGill, Reeves, Nash, D. J. Pinkava 13679* (NY); 21 September 1972, Middle and upper reaches of Cañon de La Hacienda, almost due S. of Rancho Cerro de La Madera, N. slope of Sierra de la Madera, *F. Chiang, T. Wendt,M.C. Johnston 9451c* (NY); 6 July 1989, Sierra El Carmen, ca. 20 airmiles S of US border, at Campo Dos in Cañon El Moreno (=Cn. Dos; Cn. Corte Madera), *R. Spellenberg 9940* (MEXU, NY); 31 June 1973, Cañon de Centinela just S. and SW. of Pico de Centinela, Sierra del Jardín, *M. C. Johnston 11966, T. L. Wendt, F. Chiang, D. Riskind* (NY, TEX-LL); 27 July 1973, Canyon Hundido on N. side of Pico de Centinela, Sierra del Jardin, 8 km E. of Rancho El Jardi by winding road, *M. C. Johnston 11774, F. Chiang, T. Wendt, D. Riskind* (NY, TEX-LL); 11 May 1973, Sierra de la Madera, N side, lower part of Cañon de la Hacienda, *M. C. Johnston 10968, T. L. Wendt,F. Chiang* (NY, TEX-LL); 17 September 1989, Sierra Maderas del Carmen, *E. Estrada 1805* (ANSM, CFNL, MEXU, NY); 25 August 1997, *Wood, Harper, Donn, s.n.* (ANSM); 20/26 August 1940, Sierra del Pino: vicinity of La Noria, end of road from T. Armendariz north into the Sierra del Pino, *I.M. Johsnton 513, C.H. Muller* (MEXU); 3 August 1974, *T. Wendt 476, A. Adamcewikz* (MEXU); 6 July 1936, Municipio de Villa Acuña. Sierra del Carmen; Cañon de Sentenela on Hacienda Piedra Blanca, *F. Lyle W. 556, C.H. Muller* (MEXU); 11 September 1940, Sierra Almagre: west of the old vinata above Rancho El Almagre, *I.M. Johsnton 1137, C.H. Muller* (MEXU).

10. ***Astragalus cenorrhynchus*** Barneby, Brittonia 34(1): 78–80. 1982

Type:—Mexico, Oaxaca, steep gullied hillsides, near Tepescolula, 6 Novemeber 1964, *Ripley 13664 & Barneby* (holotype NY!).

Perennial**,** subterranean **stems** up to 20 cm long, aereal stems 1–4 cm long, pubescence strigulose, the trichomes appressed, straight up to 0.3–0.4 mm long, the narrow. **Stipules** of two types, the basal ones**,** mostly in the subterranean part, semiclasping, 1–1.5 mm long, the upper ones ovate to lanceolate, 1.5–6 mm long, free. **Leaves** few and small, up to 5 cm long, leaflets 9–15, 3–11 mm long, linear, linear-oblancoelate to linear-elliptic, densely pubescent abaxially, glabrous adaxially. **Peduncles** only one per plant, sub-basal, 1.5–2.5 cm long, ascending or curved, racemes up to 1 cm long, 7–10 flowered, the flowers soon deflexed, both peduncles and racemes with dense black pubescence. **Flowers** green-yellow, concolorous; the calyx 4.2–5.8 × 2.2–2.4 mm, the tube 2.6–3 mm, the teeth 1.6–2.8 mm long, subulate; the banner 8–8.5 × 6 mm, obovate, basally cuneate, the wings 5.6–6.2 × 1–1.2 mm , the claw 1.2–1.3 mm, the blade 4.4–5.2 mm long; the keel 6 × 2.3 mm, the claw 2.5 mm long, the balde 3.5 mm long, incurved, apically

triangular. **Pod** sessile, deflexed, 8–10 × 4–5.5 mm, bilocular, trigonous in transversal view, ovoid to semi-ovoid, basally truncate, apically triangular-acuminate, ventrally carinate, lateral faces rounded, dorsally sulcate, the valves coriaceous, stramineous with age, septate, the septum 2 mm wide; ovules 18; seeds 1.2–1.4 mm long, mtten shaped, brown, light brown, sublutrous to opaque.

Distribution:—Endemic to south of Mexico, in Oaxaca (Fig. 3).

Habitat:—Steep gullied hillsides, in red sandy clay soil near 2400 m,

Comments:—*A. cenorrhynchus* resembles *A. hypoleucus* Schau., which extends

from central Mexico south to the margin of Tehuacan-Cuicatlan Desert along the Oaxaca-Puebla border. *Astragalus hypoleucus* differs however, in its dolabriform vesture, strongly connate upper stipules, and more slender pod 2.5–4 (not 2) times as long as its diameter (Fig. 9).

Specimens examined:—OAXACA: 6 November 1964, near Teposcolula. *H. D. Ripley & R. C. Barneby* 13664 (NY); 28 June 2012, Tepsecolula, *A. Ibarra 82, J. M. Miguel, A. Cruz, L. Cruz, A. Cruz R.* (MEXU).

11. ***Astragalus circumdatus*** Greene, Pittonia 1: 173. 1888

Type:—Mexico, Baja California, Hanson's Ranch, San Rafael Moiuntains, Lower California, May 1888, *Lemmon s.n.* (Holotype: 26902 NDG digital image!; isotype UC 82570 digital image!).

Perennial, dwarf. **Stems** very short, up to 23 cm long (*Thorne 55817*, MEXU), prostrate, or the tips slightly ascending, the basal nodes very short, and without leaves, strigose, the trichomes, somewhat appressed or ascendant, up to 0.5 mm long. **Stipules** 1–2 mm long, ovate, acute, the lowest clasping, wider than stem, forming a broad loose sheath, the upper ones, amplexicual, basally attached or connate and attached to the middle of its length. **Leaves** 1.2–3.5 cm long, leaflets 13–17, 1–5 mm long, eliptic to obovate, obtuse to retuse, glabrate adaxially. **Peduncles** 0.5–1.5 cm long, tilted down due to the weight of ripe fruits, thence those humistrate; the racemes 0.4–1 cm long; flowers 3–15, loose, ascendant or slightly spreading. **Flowers** *white, whitish, greenish-white, **cream, ***pale green to [1]purple; the calyx 4.2–6.2 × 2.3–2.8 mm, campanulate, papery, strigulose, the teeth 1.5–2.5 mm long, subulate; the banner 7.3–10 × 5–7 mm, ovate, widely retuse; the wings 7–9.3 × 1.4–2 mm, linear-obovate to linear-oblong, the claw 2.8–3.8 mm long, the blade 4.5–6.4 mm long, apex obtuse; the keel incurved, 6.9–8.8 × 2–2.4 mm, the claw 2.8–4 mm long, the blade 4.6–5.5 mm long, triangular at apex. **Pod** sessile, 10–16 × 4–5.5 mm, ascendant, humistrate, caducous, oblong-elliptic, elliptic to obovate, narrow at base, abruptly contracted at apex, subcylindrical, laterally compressed but somewhat convex, the sutures evident, the valves strigose, fleshy to leathery, brown to dark brown to brown-black, septum incomplete, 1–1.3 mm wide, the pod almost bilocular, sometimes more o less concealed by leaves; ovules 18–21; seeds 2–2.5 mm long, light brown, opaque.

Distribution:—Endemic to Baja California in the Sierras Juárez and San Pedro Mártir (Fig. 3).

Habitat:—Sandy, gravelly and granitic soils; meadows and sandy and gravelly meadows; along streams; shallow slope; open grassland; overgrazing grasslands and streams; grazed meadows in full sun; pine-aspen woodland; coniferous forest with; associations of oak-shrubs-grasses; 1700–2590 m.

Comments:—Species characteristic for its small size, adjacent basal internodes without leaves, short peduncles and oblong-obovoid, humistrate pod.

Specimens examined:—BAJA CALIFORNIA: 26 June 1893, San Pedro Martir , *T. S. Brandegee s.n.* (NY, CAS); 18 June 1985, Sierra San Pedro, Martir , Vallecitos: near road to Observatory and camp-ground, *R. F. Thorne 60839, R. Dahlgren, S. Boyd, D. Charlton* (NY); 7 May 1986, Sierra San Pedro Martir: near road to Observatorio, open, sandy, dry meadow at Vallecitos , *R. F. Thorne 61951, T. S. Elias, P. Rojas* (MEXU, NY); 25 May 1975, Sierra Juárez. 3 miles SE of San Pedro Martir, *R. Moran 22050* (ENCB, NY, SD); 2 June 1968, Sierra San Pedro Martir, *R. Moran 15075* (CAS, MEXU, NY, SD)*, 15084* (CAS, SD, NY); 18 June 1971, Sierra San Pedro Martir;2.0 miles west of Vallecitos., *I. L. Wiggins 21461* (ENCB, NY); 18 May 1972, La Encantada Meadow, San Pedro Martir National Park , *E. McMillan s.n.* (CAS); 17 June 1971, Near north end of Vallecitos Meadow 1mile south of road to Observatory, Sierra San Pedro Mártir , *I. L. Wiggins 21448* (CAS, ENCB); 2 July 1973, Sierra San Pedro, Martir. Locally common in dry gravelly meadow west of Los Llanitos, *R. Moran 21081* (SD, MEXU, US); 2 July 1982, Sierra San Pedro Martir; near summit of Cerro de la Cupula, *R. Moran 30983* (SD); 30 May 1977, Sierra San Pedro Martir; above Yerba Buena , *R. Moran 24204* (SD); 11 August 1977, Sierra San Pedro Martir; Rancho Viejo , *R. Moran 24490* (SD); 3 July 1972, Sierra San Pedro Martir; La Grulla , *R. Moran 19170* (SD, TEX-LL); 16 August 1967, Sierra San Pedro Martir; Yerba Buena , *R.Moran, R.F. Thorne 14238* (ENCB, SD); 24 June 1991, Sierra San Pedro Martir; Vallecitos,

D. Clemons, C. Brey 2320, 2321 (SD); 16 June 1933, Laguna Hansen, *F. F. Gander 2631* (SD); 19 August 1967, Sierra San Pedro Martir; La Encantada, *R. Moran 14380* (SD); 24 May 1992, Sierra Juarez; just north of Valle Redondo, *R. Moran 31082* (SD); 28 June 1998, Sierra San Pedro Martir, south of Vallecitos near Cerro la Botella Azul, *J. Rebman 5406* (SD); 8 June 1997, Parque Nacionale Sierra San Pedro Martir, Vallecitos meadow, extreme western margin, *J. M. Porter 11488, L. E. Machen* (SD); 9 June 2016, Sierra de San Pedro Martir: lower southwestern end of Santa Rosa meadow, *J. Rebman 31736, S. Vanderplank, A. Peralta, A. Harper* (SD).

12. *Astragalus coahuilae* M. E. Jones, Rev. N.-Amer. *Astragalus* 256. 1923

Type:—Mexico, Coahuila, Parras Coahuila, October 1910, *C. A. Purpus 4671* (Holotype: UC 145648 digital image!; isotype: 15 october 1910, *C. A.Purpus 4672* E 00383727 digital image!; syntype: March 1905, *C. A. Purpus 1078*, RSA 0002853 digital image!).

Hamosa coahuilae (M. E. Jones) Rydb., Bull. Torrey Bot. Club 54: 23. 1927.

Perennial. Stems 12–40 cm long, ascendant, strigose, the trichomes ascendant, incurved, up to 0.4 mm long. **Stípules** 1–4 mm long, clasping or semi-clasping, not connate, triangular or ovate, acuminate. **Leaves** 3–11 cm long, leaflets 13–27, 2–16 mm long, elliptic, oblong, lanceolate-oblong to obovate, emarginate, bicolored, dark-green and glabrate adaxially. **Peduncles** 3–14 cm long, straight or incurved; the racemes 1–10 cm long, lax, flowers 3–15, ascendant. **Flowers** pale purple, sometimes with white tones; the calyx 4.6–6.4 × 1.7–2.7 mm, campanulate, strigose, trichomes black and white mixed, the tube 3–3.8 mm long, the teeth 1.8–3 mm long, lanceolate; the banner 10–15 × 5–9 mm recurved, obovate to subelliptic; the wings 9.5–12 × 1.8–2.6 mm, linear-obovate, incurved, the claw 3–4.3 mm long, the blade 6.5–8.5 mm long, with white tones apically; the keel 6.6–9 × 2.1–3 mm, incurved, the claw 3–4 mm long, the blade 4.3–5.5 mm long. **Pod** 10–16 × 2.2–3.4 mm, ascendant, sessile, linear to linear-oblong or triquetrous (triangular in cross-section), narrow at base, apex abruptly beaked, sulcate dorsally, laterally flattened, the valves thin, strigulose, green, becoming ochre and stiff with age, almost imperceptibly reticulated, septum complete or almost so; ovules 10–20; seeds 2–3 mm long, brown, sometimes with purple spots, smooth.

Distribution:—Endemic to north of Mexico, Coahuila (Sierra de Parras and adjacent areas), Nuevo León (Lampazos de Naranjo), Durango (La Cieneguilla, municipality of Villa Unión) and northern Zacatecas (surroundings of San Juan de los Cedros, Municipality of Mazapil) (Fig. 4).

Habitat:—Calcareous and stony clay soils; rocky limestones; clayish loam; desert flats; shallow slopes with alluvial fans; streams; arid thickets with maguey and sotol , creosote bush, shrubs with lateral and cat-claw prickles, and Jousa tree; creosote bush scrublands with maguey and Josua tree; oak-pine-maple forest; Pine-Juniper associations; arid scrublands; 1600–2000 m.

Specimens examined:—COAHUILA: 29 June 2006, Sierra de Zapalinamé, Cañón de San Lorenzo, al sureste de Slatillo, *S. G. Gómez 223, J. S. García* (ANSM);17 June 1972, 1.0 km southeast of San Juan de los Cedros, on road to Mazapil, *M. C. Johnston 7924, F. Chiang, T. Wendt* (ANSM, MEXU, NY, SD, TEX-LL); 24 June 1987, Cañón de San José de los Nuncio, Ramos—Arizpe, *A. Rodríguez 865, M. A. Carranza* (ANSM, CIIDIR, ENCB, MEXU); 21 August 1999, Sierra de la Babia, Coahuila, *M. A. Carranza C-3044, T. Wendt, D. Riskind, J. Henrickson,* (ANSM, TEX-LL); 11 September 1963, 3 miles W of Parras, *H. D. Ripley 13513, R. C. Barneby* (MEXU, NY, US); 8–28 June 1880, Parras, 111½ miles west of Saltillo, *E. Palmer 234* (TEX, NY, US); 15 October 1983, Ejido Siete de Enero aprox. 36 km al SE de Parras de la Fuente, *A. Rodríguez 1072, M. A. Carranza* (CIIDIR, NY); X-1910, Sierra de Parras, *C. A. Purpus 4672* (US); 6 March 1983, Parras, *A. Rodríguez 82 et al.* (ENCB). **DURANGO:** 7 May 1981, Villa Unión, Durango, *S. González 1659, M. González* (CIIDIR). **NUEVO LEÓN:** 26 March 1944, Thurty six miles northeast of Sabinas Hidalgo, *G. Webster 13504, F. Barkley* (US); 26 March 1944, Thirty-six miles northeast of Sabinas Hidalgo, *F. A. Barkley 14576* (US). **ZACATECAS:** 13/14 August 1904, Zacatecas, Near Concepción del Oro, *E. Palmer 305* (US); 1-X-1910, Sierra de Parras., *C. A. Purpus* (US); 30 August 1971, 1 mile W of Concepcion del Oro along road to the main mine*J. Henrickson 6255* (IEB, MEXU, TEX-LL).

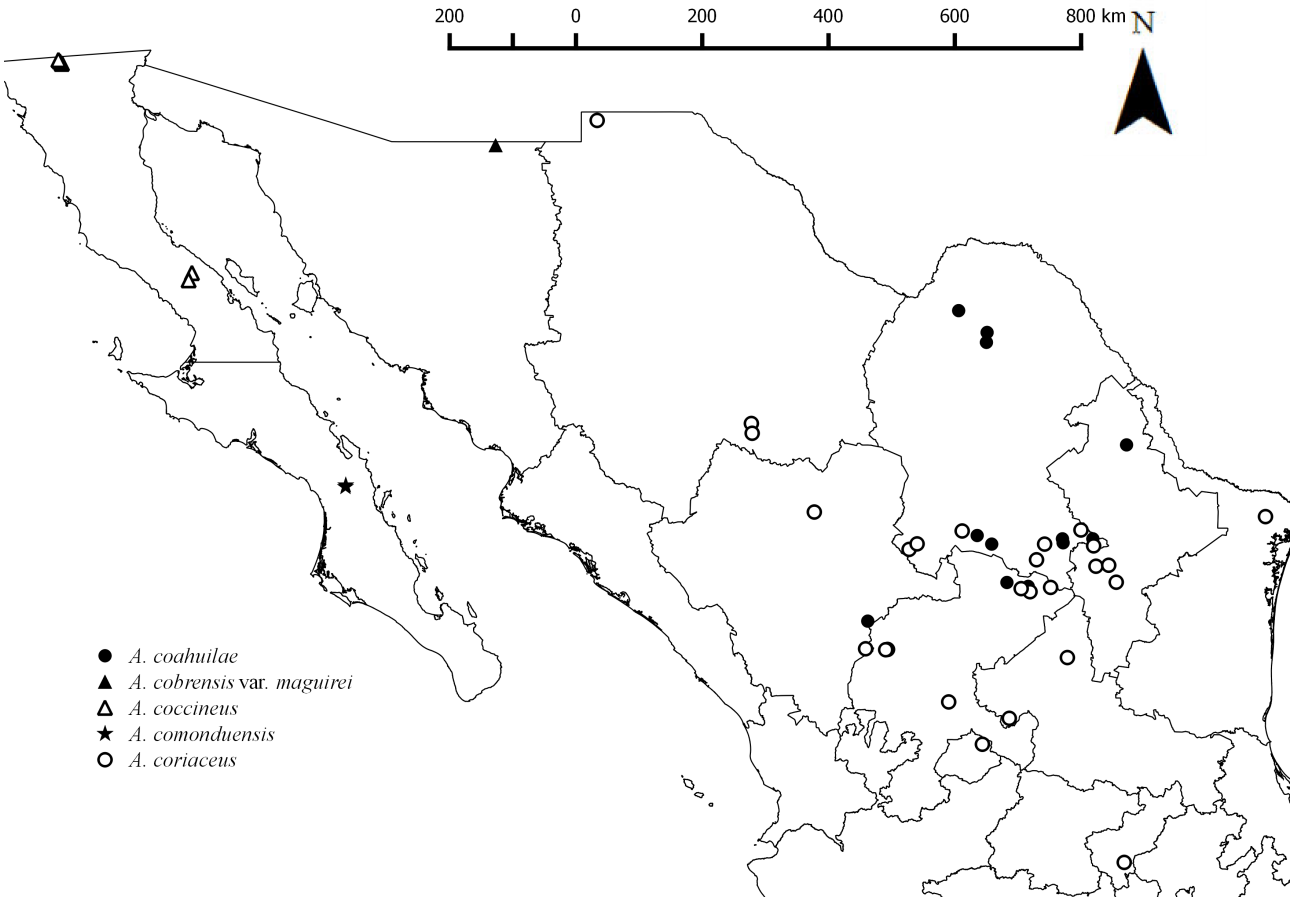

FIGURE 4. Map showing the distribution of *Astragalus coahuilae, A. cobrensis* var. *maguirei, A. coccineus, A. comonduensis,* and *A. coriaceus* in Mexico.

13. ***Astragalus cobrensis*** A. Gray var. ***maguirei*** Kearney, Wash. Jour. Acad. Sci. 30: 218. 1940

Type:—USA, Arizona, Cochise County, White Tail Canyon, Chiricahua Mountains, 2 May 1935, *B. Maguire et al. 11079* (holotype: US 00004061 digital image!; isotype: ARIZ fdb74774-5ed2-45b8-9e83-1147c3b5f2dc).

Perennial. **Stems** up to 15 cm long, decumbent o slightly ascendant, subterranean few centimeters, flexuose, pilose, the trichomes up to 0.8 mm long, rigid, spreading or incurved. **Stipules** 1.5–5 mm long, the lowest ones connate, lax clasping, forming a collar or a bidentate sheath around the stem, the upper ones attached at the base or up to the half, triangular. **Leaves** 1–11 cm long, leaflets 7–23, 1.5–17 mm long, oblong, elliptic, obovate to suborbicular, emarginate, bicolored, abaxially lighter, glabrate or subglabrate adaxially. **Peduncles** 1–8.5 cm long; the racemes 1–7.5 cm long, lax, flowers 8–33, pendulous with age. **Flowers** whitish with lilac tones; the calyx 3.2–4.5 × 1.6–2.2 mm, strigose, with black and sometimes white scattered trichomes, the tube 2.2–2.7 mm long, campanulate to turbinate-campanulate, the teeth 1–1.8 mm long, subulate; the banner 6.4–7.8 × 4.2–5.9 mm, obovate to rhombic-ovate, retuse; the wings 6.1–7.7 × 1.7–3 mm, the claw 1.9–2.6 mm long, the blade 4.2–5.9 mm long, triangular-obovate, to obliquely-eliptic, incurved; the keel 4.4–6.1 × 1.7–2.3 mm, the claw 1.9–2.7 mm long, the blade 2.5–3.8 mm long, semi-obovate to semicircular, incurved. **Pod** deflexed, subsessile, the stipe minute or almos absent, 7–15 × 3.5–6 mm, oblong, elliptic or clavate, straight to curved, gradually narrowed at base, apex ending in triangular beak, obcompressed, ventrally convex, flattened to openly sulcate dorsally, the valves green, shiny, the trichomes white, turning papery and ochre with age, reticulate, septum complete, the pod thence bilocular o almost so; ovules 10–13; seeds 2.4–3 mm long, brown, somewhat rugose.

Distribution:—Rare in Mexico, known only from Sierra San Luis at northwestern Sonora, in the border with Chihuahua, and approximately 12 km from the border of New Mexico (USA). Also, in New Mexico and Arizona (USA) (Fig. 4).

Habitat:—Near riparian vegetation, associated to elm, mezquite and sycamore, 1200 m (Spellenberg et al, 1995).

Specimens examined:—SONORA: not date, Mpio. Agua Prieta, *S. Carnahan n.n., T. Van Devender, A. L. Reina-G., V. Markgraf . Reichenbacher, S. Hale, C. Smith* (USON)

14. ***Astragalus coccineus*** (Parry) Brandegee, Zoë 2: 72. 1891

Type (Cotypi):—USA, Arizona, Inyo County, Lone Pine, Inyo Ringe, Brandegee non date, two specimens on sheet, UC 83886.
Xylophacos coccineus (Brandegee) A. Heller, Muhlenbergia 2: 217. 1906.
Astragalus grandiflorus S. Watson, Proc. Amer. Acad. Arts 17: 370. 1882.
Astragalus purshii Douglas var. *coccineus* Parry ex Orcutt, W. Amer. Sci. 7: 10. 1890.

Perennial. Stems subterranean, buried, emerging from subsoil, thence acaulescent, the aereal stems small, up to 13 cm long, densely white-grayish, the trichomes 1.3–2.5 mm long, of two sizes, short and long ones, ascendant to spreading. **Stipules** 5–10 mm long, semi-clasping, not connate, and not so evident due to dense pubescence, triangular to lanceolate. **Leaves** basal, rising from the apex of the root, 2–10 cm long; leaflets 7–15, sometimes, the pairs widely separated to each other, 3–14 mm long, elliptic, oblanceolate or spathulate. **Peduncles** 2–10 cm long; the racemes 0.5–2.5 cm long, flowers 3–10, ascendant. **Flowers** red, the banner with central whitish area and purple veined; the calyx cylindrical, 16–24.5 × 4.5–6. mm, ordinarily dense white pubescent, seldom with few black scattered trichomes, the tube 12–16 mm long, reddish; the teeth 3.5–8 mm long, hard, lanceolate; the banner recurved, 3.5–4.5 × 1.2–1.8 cm, oblanceolate, obtuse; the wings 3.4–3.7 × 0.3–0.4 cm, linear to oblong or lanceolate; the claw 1.6–2.2 cm long, the blade 1.8–2 cm long; the keel 3.8–4 × 0.5–0.8 cm, the claw 1.7–2.1 cm long, the blade 1.9–2 cm long. **Pod** 2.5–4 × 0.9–1.5 cm, humistrate but ascendant when fruit rippen, ovate, ovate-elliptic to ovoid, sometimes lunate, base rounded or narrow, compressed basally, sulcate apically, and ending in a short beak, the valves sub-fleshy, turning leathery with age, not evidently, coarse, septum absent, pubescence dense as stems; ovules 33–45; seeds 2.5–4.2 mm long, mostly brown, sometimes with purple tones.

Distribution:—Rare in Mexico, only from Baja California in the north extreme portion(Sierra Juárez and La Rumorosa surrounding area) and in the central portion (Sierra La Asamblea). Also in Nevada, Colorado, Arizona and California (USA) (Fig. 4).

Habitat:—Gravelly soils, in pine forest with juniper, and madrone, 1300 m. Also present in California (USA).

Comments:—Species easily differentiable from others for its small size, acaulescent, and narrow red flowers; unmistakable with any other Mexican species.

Specimens examined:—BAJA CALIFORNIA: 17 April 1994, 1 mile W of La Rumorosa, along Mex. Rte. 2, between Tecate and Mexicali, *J. Rebman 2618* (BCMEX, SD); 14 April 1977, Sierra Juárez. Old grade 7 km W of La Rumorosa, *R. Moran 24068* (ENCB, NY); 16 May 1982, Sierra Juarez; 4.0 km southwest of La Rumorosa, *R. Moran 30741* (SD); 14 April 1979, Sierra Juarez; Cuesta Blanca, 6.0 km west of La Rumorosa *R. Moran 27006* (CAS, SD); 15 May 1977, Sierra Juarez; 5.0 km west of La Rumorosa, *R. Moran 24122* (SD); 24 April 2004, Sierra La Asamblea: northeast of El Crucero (junction of Hwy. 1 & the road to Bahia de Los Angeles), NNW of Rancho San Luis; along the trail to Cerro La Equis, NW of the camp called Datililllo, *J. Rebman 10000, M. Salazar, H. Riemann, B. Vinton* (SD); IV-1932, Alaska, a small military outpost on road from mexicali to Tia Juana, *F. M. Cota s.n.* (CAS, US).

15. ***Astragalus comonduensis*** A. E. Estrada, Rebman & Villarreal, Phytotaxa 391(1): 59–60. 2019

Annual plant, caulescent. **Stems** erect, up to 45 cm long, striate, green or green-reddish, turning purple when dry, strigulose, the trichomes 0.2–0.5 mm long, white, straight, appressed. **Stipules** free or some clasping by half to three-quarters of stem´s circumference, straight or basally oblique, 2–3 × 1–2 mm, ovate to triangular-lanceolate, brown-yellow, strigulose abaxially, the trichomes 0.2–0.5 mm long, white with some black ones intermixed, glabrate adaxially, margins ciliate. **Leaves** 2–7.9 cm long; leaflets 13–21, 3.2–17 × 1.4–4 mm, elliptic to elliptic-obovate, base acute, apex mucronate, mucro 0.1–0.3 mm long, glabrate adaxially, strigulose abaxially with white trichomes. **Peduncles** 3.8–4.9 cm long, erect, ascending, sparsely strigulose, with both white and black trichomes; racemes 1.6–4.4 cm long, 4–9 flowered; flowers mostly ascending, and remaining so in fruit, rarely spreading. **Flowers** purple-lavender, some flowers becoming bluish with age, the calyx 2–2.8 × 1–1.2 mm, campanulate, the tube 2–2.8 mm long, slightly inequilaterous,

strigulose, with white and black trichomes, the teeth 0.8–1.2 mm long, lanceolate to triangular-lanceolate, green, green-reddish to reddish, sparsely strigulose as the tube; the banner sessile, 4.5–5 × 2.1–2.2 mm, elliptic to elliptic-obovate, sometimes longitudinally inequilaterous, recurved, apically retuse; the wings 4.2–4.6 × 1.3–1.4 mm, the claw 2–2.1 mm long, the blade 2–2.3 mm long, oblong, oblique, half-obovate, the apex rounded; the keel 3.9–4 × 1.2–1.3 mm, the claw 1.8–1.9 mm long, the blade 1.9–2 mm long, incurved, half obovate, apically triangular, the beak curved slightly backwards. **Pod** ascending when young and remaining so, sessile, oblique-ovoid, subglobose, bladdery-inflated, 10–14 × 6–10 mm, basally somewhat cuneate, distally abruptly contracted in a triangular, slightly laterally compressed, 2–3 mm long beak, ventrally shallow sulcate by the filiform suture and it less convex than the also filiform dorsal suture, the valves little flattened dorsoventrally, sparsely and minute strigulose, the trichomes 0.1–0.3 mm long, tan to reddish, becoming purple when dry, subdiaphanous to opaque; ovules 7–9; seeds 2.1–2.5 mm long, opaque, smooth, light-brown to brown.

Distribution:—Species endemic to Mexico, exclusively of Baja California Sur, restricted to Llano La Laguna in the Sierra La Giganta region, north of San José de Comondú (Fig. 4).

Habitat:—This species grows in wet muddy soil near the water's edge along the banks of ephemeral lakes.

Comments:—This species resembles *A. aridus,* but *A. comonduensis* reaches up to 42 cm tall, and its stems are erect. The pubescence of *A. comonduensis* is strigulose, 0.2–0.5 mm long, straight, with white and appressed trichomes, while, in *A. aridus* is silky or satiny-canescent, with ascending 0.6–1.1 mm long trichomes. The calyx of *A. comonduensis* is shorter (2–2.8 mm long) and narrower, than that of *A. aridus* (3.2–4.4 mm long), plus it exhibits both with white and black intermixed trichomes unlike the uniformly white trichomes of *A. aridus*. *Astragalus comonduensis* has purple-lavender petals while *A. aridus* has whitish, pink-lilac or flesh color flowers. The pods of *A. comonduensis* is completely inflated, bladdery, proportionally wider, shiny, and not laterally compressed (not even a little), opaque to sub-diaphanous, and minutely-strigulose, while the pods of *A. aridus* are little inflated, but not bladdery, laterally compressed at both ends, and strongly so at the apex, with the valves densely white canescent to strigulose-pilose, papery, and opaque. *Astragalus insularis* and *A. idrietorum*, also found on the Peninsula of Baja California and are physiognomically somewhat similar to *A. comonduensis*, but these two last species can easily be distinguished by their much longer perianth parts.

Specimens examined:—BAJA CALIFORNIA SUR: 9 March 2016, Llano La Laguna: Sierra de la Giganta Region, north of San José de Comondú near Rancho Palo Fierro; *J. Rebman 31220, R. Domínguez Cadena, F. Pio León* (SD); 14-III-20002, La Laguna, al norte de San José de Comondú, *M. Dominguez L. 3140* (SD) .

16. *Astragalus coriaceus* Hemsl., Biol. Cent.-Amer., Bot. 1(3): 263–264

Type:—Mexico, Zacatecas, North Mexico, Zacatecas, *Coulter s.n.* (holotype: K000478291 digital image!).

Tragacantha coriacea (Hemsl.) Kuntze, Revis. Gen. Pl. 2: 944. 1891.—*Pisophaca coriacea* Rydb. N. Amer. Fl. 24(6): 326. 1929.

Astragalus antoninus S. Watson, Proc. Amer. Acad. Arts 13: 343. 1882 .—*Pisophaca antonina* (S. Watson) Rydb. N. Amer. Fl. 24(6): 327. 1929.

Perennial. Stems prostrate, suberect to erect, up to 50 cm long, strigose, the trichomes 0.2–0.5 mm long, dense, commonly appressed. **Stipules** connate (the lowest ones) and bidentate, 1–2 mm long, the upper ones triangular, clasping or apparently free, but weakly joined at the base along a thin line for a half or almost 3/4 of the stem´s circumference. **Leaves** 2–9.5 cm long, leaflets 11–23, each pair widely separated from each other, 2–20 mm long, linear, lanceolate, lanceolate-obovate, rarely oblong-linear, apex entire or retuse. **Peduncles** 4–15 cm long, ascendant or somewhat curved; the racemes 1–8 cm long, flowers 5–16, ascendant. **Flowers** purple, purple to blue, light purple, pink-purple to dull reddish-violet, the banner with whitish center and red-violet veins; the calyx cylindrial, rarely somewhat campanulate, cylindrical, 5.6–8.7 × 2–3 mm, strigose, with black and withe trichomes mixed, or just one of them present, the tube 4.3–6.2 mm long, the teeth lanceolate, 1–3 mm long; the banner rhombic to obvate-rhombic, 13–17 × 5.3–10 mm, emarginate; the wings 12–15.3 × 2.5–3.4 mm, oblanceolate, the claw 4.2–7 mm long, the blade 8–9.8 mm long; the keel incurved, obovate, 10–13 × 2.3–3.3 mm, the claw 4–6.5 mm long, the blade 5.6–7 mm long. **Pod** ascendant, sessile, rarely with a minute, 1 mm long stipe present, the body inflated but hard and stiffly, non bladdery inflated and papery, 12–24 × 5–9 mm, ovate to elliptic, base rounded, long apiculate distally, unilocular, the valves leathery or fleshy, hard, brown, dark-brown to reddish-brown, strigose, with black or white trichomes or a mix of both, septum absent; ovules 20–31; seeds 2–2.5 mm long, brown to black.

Distribution:—From Chihuahua and Coahuila to Nuevo León, further south, from Durango, San Luis Potosí and Zacatecas to Aguascalientes (Fig. 4).

Habitat:—Plains, ravines and hills with sandy or stony, exposed rock, clayey, and red to reddish soils; gravelly gullied hills; bare sandstone; rolling hills; heavily grazed hills; chaparral and oak forest, associated with Josua tree, stool, pine, and maguey; low scrubland with Josua tree and prickly pear; pine-oak forests; pine-juniper forest; oak-douglas fir forest; pine-josua tree forest; common in disturbed and overgrazed areas; along the road; 1981–3000 m.

Comments:—Easily recognizable by its linear to lanceolate leaflets well separate from each other and the erect pod, it remaining adhered for a long time in the plant.

Specimens examined:—AGUASCALIENTES: 21 August 1976, ca. 20 km east of Rincón de Romos, road to Asientos, between Cerro Altamira and Cerro de San Juan, *Rzedowski, McVaugh 1214* (ENCB). **CHIHUAHUA.** 26 October 1996, Sierra Rica, Mpio. Manuel Benavides, *E. Estrada 6494, 6496* (CFNL); 25 October 1996, Chihuahua, Manuel Benavides, Sierra Rica, *E. Estrada 6515, C Yen* (MEXU); 25 October 1996, Chihuahua, Manuel Benavides, Sierra Rica, *E. Estrada 6525, C Yen* (MEXU); 9 August 1956, 11 miles north of Parral, *U. T. Waterfall 12516* (US); 23 September 1985, Hidalgo—de Parral (cerro de La Antena), *Ochoa 204* (MEXU). **COAHUILA**: 29 July 1992, Sierra Catana, *J. A. Villarreal 6475, M. A Carranza, H. Nieto* (ANSM, TEX-LL); 29 September 1995, Sierra de Jimulco, Mpio. Torreón, *J. A. Villarreal 8336, M. A. Carranza* (ANSM, MEXU); 20 May 2015, Sierra de Zapalinamé, 2.4 km al NE del Ejido Cuauhtémoc, *J. A. Encina 4734, J. Cárdenas* (ANSM, IEB); 3 July 1985, 13 mi (20.8 km) E of Arteaga on road (terracería) to Las Vigas (Las Copetonas), *C. P. Cowan 5390, M. Luckow and N. Jacobson* (NY, TEX-LL); 27 June 1941, Northcraft, Coahuila , 11 kilo. northeast of Jimulco, *L. R. Stanford 17, K. L. Retherford. R. D. Northcraft* (CAS, MEXU, NY); 10/13 July 1880, Q. Lerios, a mountain section, 15 miles east of Saltillo., *E. Palmer 239* (US). **DURANGO**: 23 October 1943, Cuchillas de Carca, *H. S. Gentry 6962* (NY); 13 August 1984, Súchil, al NE, cerca del rancho La Soledad, *S. González 2915, S. Acevedo* (ANSM, MEXU. **NUEVO LEÓN**: 31 May 1983, Gravel road from San Rafael (Hwy 57) to San Pedro and Galena, 11.2 mi SE of San Rafael and 0.9 mi NW of San Pedro, *L. J. Dorr 2643, L. C. Barnett, C. P. Cowan* (ENCB, MEXU, NY); 22 July 1977, Nuevo León , Ca. 1 mi WSW of San Pablo in small valley, 15 mi E of San Rafael off Hwy 57, *C. Wells 112, G. Nesom* (NY); 4 June 1985, *M. Luckow 2648, C. Cowan,N. Jacobson* (MEXU, NY); 10 August 1989, Ejido El Orito, Mpiop. Galeana, *E. Estrada 1636* (MEXU, NY, TEX-LL); 22 March 2003, *E. Estrada 15319* (CFNL). **QUERÉTARO:** 26 August 1989, 2 km al N de Cazadero, municipio de San Juan del Río, *Rzedowski* 48761 (IEB). **SAN LUIS POTOSÍ**: 24 July 1934, Santa Ana, above Potrero, Sierra de Catorce. Sierra Madre Oriental. West of Santa Ana, *F. W. Pennell 17533* (NY, US); 16 June 1971, 3 miles E of Zacatecas line, W of Penon Blanco, along Highway 49, *R. Spellenberg 2597, R. C. Moore* (NY). **TAMAULIPAS:** 22 July 1949, Tamaulipas: Between Marcella and Hermosa, *Stanford, Lauber, Taylor 2652* (CAS, US). **ZACATECAS**: 14 October 2008, Sierra Las Bocas, carretera a Mazapil-Zacatecas, *J. A. Villarreal 9446, I. Ramírez* (ANSM); 14 October 2008, Sierra Las Bocas, carretera a Mazapil, *J. A. Villarreal 9457, I. Ramírez* (ANSM, CIIDIR); 22 July 1941, On mountain 18 km west of Concepcion del Oro on Coahuila-Zacatecas border, *L. R. Stanford 565, K. L. Retherford, R. D. Northcraft* (CAS, NY); 16 August 1959, 7 miles northwest of Zacatecas, *U. T. Waterfall 15606* (NY); 2 July 1973, Sierra del Astillero (approached from southeast, from Tanque El Alto), *M. C. Johnston 11563, T. L. Wendt,F. Chiang* (NY); 15 October 1965, Zacatecas , 4 miles east of Sombrerete, *H. D. Ripley 14151, R. C. Barneby* (NY); 8 November 1963, Zacatecas , 2 miles east of Sombrerete, *H. D. Ripley 13459, R. C. Barneby* (CAS, NY); 18 July 1934/19 July 1934, Mexico. Sierra Madre Oriental. Rocky limestone, *F. W. Pennell 17417* (NY).

17. ***Astragalus crotalariae*** (Benth.) A. Gray, Proc. Amer. Acad. Arts 6: 216. 1864

Type:—USA, California, Monterey, California, *Coulter 436* K (holotype K) not seen.

Phaca crotalariae Benth., Pl. Hartw. 307. 1848.**—***Tragacantha crotalariae* (Benth.) Kuntze, Rev. Gen. 2: 944. 1891.

Astragalus limatus E. Sheld., Minnesota Bot. Stud. 1(3): 126–127. 1894. *A. preussii* A. Gray var. *limatus* (E. Sheld.) Jeps., Man. Fl. Pl. Calif. 566. 1925.

Perennial, hard, with bad smell. **Stems** up to 70 cm long, striate, hollow, green-yellowish, strigose to pilose, the trichomes up to 1.3 mm long. **Stipules** 3.7–13 mm long, ovate, wider than longer, clasping to semi-clasping, not connate. **Leaves** 5–16 cm long, the leaflets 5–17, 5–36 mm long, elliptic, oblong, obovate to spathulate, rarely suborbicular, retuse, glabrate or scarcely pilose adaxially. **Peduncles**, 5–17.5 cm long, straight, hard; the racemes 2–9 cm long, flowers 10–27, ascendant. **Flowers** rose, purple, magenta, turning violet when dry, rarely totally white; the calyx 7.5–12.4 × 3.5–6.7 mm, papery, strigose or pilose, the trichome black and white, the tube campanulate to

subcylindrical, 6.3–6.7 mm long, reddish or with reddish-purple tones, the teeth triangular to subulate, 1.2–2.7 mm long; the banner 21–28 × 8–14 mm, rhombic to spathulate, entire o slightly emarginated apically; the wings 19–25 mm × 3–5 mm, linear to oblong, to oblong-obovate, the claw 8.5–11.4 mm long, the blade 10.6–15 mm long; the keel 17.3–22 × 3–5.2 mm, incurved, the claw 8.6–11.4 mm long, the blade 8.6–11 mm long. **Pod** estipitate, the stipe 1–1.4 mm long, the body 2–3 × 1–1.6 cm, spread or ascendant, somewhat compressed laterally, elliptic, ovoid, abruptly or gradually narrowed at base, inflated but somewhat leathery, the apex with a curved ot straight short beak, the valves sparsely or densely strigose, yellowish, light-brown, brown to dark-brown, lightly reticulate, septum absent; ovules 24–38; seeds 3–4.4 mm long, brown or brown-purple, opaque.

Distribution:—In Mexico, known only in the extreme north of the state of Baja California, adjacent to the border with the USA. New River (apparently translated from Río Nuevo, river located near Mexicali). Also present in Arizona and California (USA) (Fig. 5).

Habitat:—Rare, only one record, registered in scrubland areas. Also in Arizona and California (USA).

Comments:—*A. crotalariae* is distinguished by its large flowers (23–28 mm long) and restricted distribution in Mexico.

Specimens examined:—BAJA CALIFORNIA: 2 April 1905, Plains of New River, *T. MacDougal 223* (NY).

18. ***Astragalus daleae*** Greene, Pittonia 1(9): 153. 1888

Type:—Mexico, Durango, Sierra Madre, west of Durango, September and October 1881, *A. Forrer s.n.* (Holotype NDG 26906 digital image!; isotype: GH 00059410 digital image!)

Perennial. Stems up to 47 cm long, strigose, the trichomes up to 0.5 mm long, appressed. **Stipules** 2–10 mm long, ovate to lanceolate. **Leaves** 3–7.6 cm long, leaflets 15–31, 2–10 mm long, oblong, elliptic, elliptic-obovate to obovate. **Peduncles** 4–11 cm long, straight or barely curved; the racemes 3–8.3 cm long, dense, flowers 20–68 pendulous; **bracts** 2–7 mm long, elliptic, boat shaped, ascendant when young, deflexed with age, strigose to glabrate abaxially. **Flowers** pale-yellow*, white-greenish to ochroleucous; the calyx 2.6–3.6 × 2.5 mm, campanulate, the tube 1.9–2.5 mm long, the teeth 0.8–1.1 mm long, wide-triangular to subulate; the banner 5.6–6.5 × 4.4–5 mm, ovate to suborbicular; the wings 6–6.2 mm × 1.2–1.3 mm, the claw 2.8–2.9 mm long, the blade 3–3.2 mm long, oblong, the keel 4.7–5.4 × 2–2.3 mm, the claw 2.8–2.9 mm long, the blade 2.8–2.9 mm long. **Pod** persistent or tardily separating from receptacle, 7–12 × 2 mm, deflexed, sessile, triquetrous, linear, lancoelate to oblong, straight to curved, basally rounded, the apex ending in a cuspidate contracted beak, compressed, dorsally sulcate, laterally mildly convex but abruptly rounded, the valves thin, somewhat papery, turning harder with age, green when young, turning black with age, strigose, the trichomes mostly white with some scattered black ones mixed, septum complete, thence bilocular; ovules 9–11; seeds 1.2–1.7 mm long, ligh brown, olive-brown, smooth.

Distribution:—Mountains of northwestern Mexico, Chihuahua, (among Yepachi, Tomochi and Uruachi) and Durango (around Tepehuanes, Canelas, Topia and El Salto) (Fig. 5).

Habitat:—Sandy soils, near river; steep cliffs; with riparian vegetation; cold coniferous forests; open and moist slopes; cool conifer forest; pine-oak forest; associations with pine-juniper-oak-madrone; 2000–2620 m.

Comments:—Morphologically similar to *A. vaccarum*, but this one, having plane bracts. **D. E. Breedlove 63018* (NY).

Specimens examined:—CHIHUAHUA: 12 September 1987, Parque Nacional de la Cascada de Basaseachic, along benches of Rio Bassasechic about 100 m above falls, *R. W. Spellenberg 9288, D. Jewell* (NY); **DURANGO:** 12 August 1961, Puerto Buenos Aires, 30 miles southwest of El Salto, *U. T. Waterfall 16211* (NY); 12 August 1956, Durango, Mexico, Mountain side near steep cliffs, 33 miles southwest of El Salto, *U. T. Waterfall 12715* (CAS, TEX, US); 24 August 1986, Just S of Puerto Buenas Aires along Mexican Hwy 40 between Mazatlan and Durango, *D. E. Breedlove 63018, B. Anderson* (NY); 6 October 1965, Crest of Sierra Madre near Pto. Buenos Aires, 34 mi. w. of El Salto on Mazatlan highway, *H. D. Ripley 1406, R. C. Barneby* (NY); 18 October 1965, Sierra Madre 20 miles w. of El Salto, *H. D. D. Ripley 14187* (NY); 18 August 1982, 111 road mi. NW of Santiago Papasquiaro, on road to Topia, 5 mi. W of Cienaga Nuestra Señora, *R. W. Spellenberg 6715* (MEXU); 6 October 1965, Crest of Sierra Madre near Pto. Buenos Aires, 34 mi. w. of El Salto on Mazatlan highway, *H. D. Ripley 14006* (NY). **SINALOA:** September 1919, Panuco, municipio de Concordia, *M. P. Dehesa 1585* (CalBG:RSA, Image, Catalog number: RSA0006892).

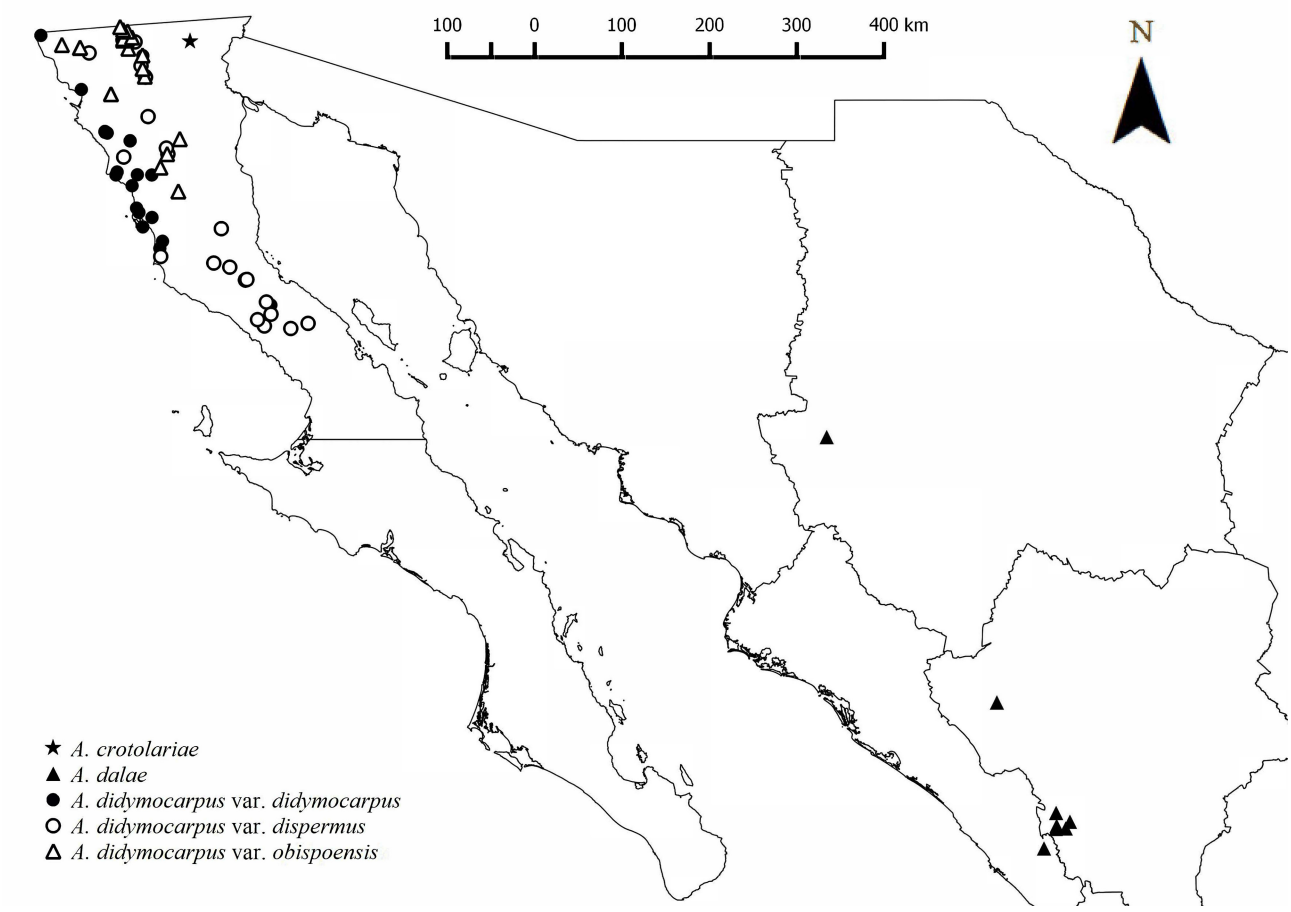

FIGURE 5. Map showing the distribution of *Astragalus crotalariae, A. daleae, A. coccineus, A. didymocarpus* var. *didymarpus, A. didymocarpus* var. *dispermus,* and *A. didymocarpus* var. *obispoensis* in Mexico.

19. ***Astragalus didymocarpus*** Hook. & Arn., Bot. Beechey Voy. 334, pl. 81. 1840

Annual or perennial but of short duration. **Stems** up to 45 cm long, erect o decumbent with the stems spreading, branched from base, strigose to canescent, the trichomes up to 0.8 mm long, straight to ascending, appressed. **Stipules** 0.5–1.5 mm long, triangular, ovate to lanceolate, semi-clasping, not connate. **Leaves** 1–7.5 cm long, leaflets 9–17, 1–14 mm long, linear, oblong to oblanceolate, retuse, glabrate or slightly pubescent adaxially. **Peduncles** 1–8 cm long; the racemes 0.5–2.2 cm long, compact, and dense, oblong, cylindrical, ovoid or subglobose, flowers 5–30, ascendant. **Flowers** white, pale-pink, blue*, blue-purple**, purplish***, purplish-lilac, blue-violet, with lavender to rose-purple tones, occasionally turning bluish when drying; the calyx 3–5.4 × 1.6–3.2 mm, campanulate, ovate o dome shaped (turbinate), dense pubsecent with straight white, black or mix of both trichomes, up to 1 mm long, the tube 1.6–3.2 mm long, the teeth 0.8–2.5 mm long, linear to subulate; the banner 4–9.8 mm long, recurved, spathulate, shallowly retuse; the wings 2.8–7.1 mm long; the keel 3–7.2 mm long. **Pod** 2–4.2 mm long, ascendant or spread, sessile, inflate, globose to subglobose, laterally compressed, ventrally carinate and dorsally sulcate, inequilateorus, gibous, the valves slightly fleshy, turning hard-papery with age, with scattered or dense pubescense distally only, the trichomes adjacent to the veins, rarely the pod glabrate, greenish, becoming brown with age, occasionally purple speckled, evident reticulate, the veins elevated and prominent, septum complete, the pod thence bilocular or almost so; ovules 2; seeds 1.4–2.7 mm long, ochre, olive, brown to orange.

Distribution:—In Mexico, restricted to Baja California, from Tijuana, Tecate and La Rumorosa spreading south to Sierra Juárez and Sierra San Pedro Mártir to Cataviña; from the west coast, through Rosarito, Ensenada, Vicente Guerrero, San Quintín to El Rosario. Also, distributed in California, Arizona and Nevada (USA). Three of the infraspecific categories extend their distribution from north California to almost the southern end of Baja California.

Comments:—Three of its four varieties are distributed in Mexico, separated on the basis of petal and calyx teeth size and color of the pubescence. The species is discernible by its annual habit, compact racemes, and small flowers and pods, those always having only 2 seeds.

1. Keel 4.7–7.2 mm long ..... **var. *obispoensis***
- Keel 2.4–4.5 mm long 2
2. Calyx teeth 1.6–2.4 mm long, or, if shorter, always slightly longer than tube; calyx mainly with white trichomes, rarely the teeth with several black trichomes; stems prostrate ..... **var. *dispermus***
- Calyx teeth shorter than tube, occasionally of the same size, 0.8–1.4 mm long; calyx mainly with black trichomes, rarely the teeth with several spread white trichomes; stems commonly erect ..... **var. *didymocarpus***

19.1 ***Astragalus didymocarpus*** Hook. & Arn. var. ***didymocarpus***

Type:—USA, California, Douglas, *Douglas s.n. 1833* (holotype: K 000999251 digital image!; isotype: G 00386354 digital image!, NY 0005398 digital image!

Tragacantha didymocarpa (Hook. & Arn.) Kuntze, Revis. Gen. Pl. 2: 944. 1891.—*Hesperastragalus didymocarpus* (Hook. & Arn.) A. Heller, Muhlenbergia 2(18): 87. 1905.—*Astragalus didymocarpus* Hook. & Arn.var. *daleoides* Barneby, Aliso 2(3): 212. 1950.

Astragalus catalinensis Nutt., Jour. Acad. Nat. Sci. Philadelphia 4(1): 9. 1848; *Hesperastragalus catalinensis* (Nutt.) Rydb., Bull. Torrey Bot. Club 53(3): 169. 1926.

Hesperastragalus compactus A. Heller, Muhlenbergia 2(2A): 218–219. 1906.

Characteristics as in the key. **I. L. Wiggins 5232* (CAS); *** I. L. Wiggins 5245* (CAS).

Distribution:—From Tijuana to Sierra Juárez; west coast through Ensenada, San Quintín to El Rosario and Punta Baja. Also, in California and Nevada (USA) (Fig. 5).

Habitat:—Sandy flats; sandy-gravelly roadbanks, clay soil; canyons along roads; vernal lakes; roadside; grassy claearings; arroyo beds; granite and sandy soils; plains; canyons; valleys; abandoned and cleared fields; coastal succulent scrub; burned pastures; chaparral; coastal scrub; saline ponds and salt flat; juniper forests; *Pinus* forest; 30–1625 m.

Specimens examined:—BAJA CALIFORNIA: 12 April 1882, Ensenada, *M. E. Jones n.n* (NY); 19 April 1886, San Telmo, *C. R. Orcutt s.n.* (CAS, NY); 1-?-1889, San Quinin, *E. Palmer 614* (CAS, NY, US); 10 April 1931, Rosario Wash.,*I. L. Wiggins 5245* (CAS, NY); 9 April 1931, Small canyon 10 miles north of Rosario, *I. L. Wiggins 5232* (CAS, NY, TEX-LL); 4 April 1958, 14.0 km northwest of Colonia Guerrero, *P. H. Raven 12219, H. Lewis, H. Thompson* (CAS); 17 April 1958, San Quintin, *P. H. Raven 12344, M. Mathias, J. Turner* (CAS); 25 March 1949, 1 mile north of west side of Laguna Santa Maria near San Quintin, *J. H. Thomas 171* (CAS); 7 April 1936, San Quintin, *C. Epling, Wm. Stewart s.n.* (CAS); 4 June 1941, San Telmo Plains 7 miles east of san Telmo on road to Rancho San Jose (Meling's Ranch), *I. L. Wiggins 9725* (CAS); 7 July 1980, SE side of Laguna Mormona, 7 km NW of San Quentín Nuevo, at edge of a barley field bordering a salt flat, *R. Moran 29005* (SD); 22 May 1965, Canyon 8.3 miles north of San Vicente on Ensenada Hwy, base of west-facing slope, *P. Mudie 466* (SD); 9 May 1978, Sierra San Pedro Martir, on north slope, 9 km west of San José, *R. Moran 25806* (SD); 25 March 1973, Ca. 2 km east of the eastern shore of Laguna Mormona, in abandoned field, *P. J. Mudie 1113-11* (SD); 24 March 1973, Boca de Arroyo San Telmo, ca. 1.5 miles south of Cabo Colnett, saline pond & salt flat behind high (ca. 4 meters) cobble berm spanning the mouth of the arroyo, *P. J. Mudie 1017* (SD); 4 April 1982, Cañon San José, 17 km east of San Vicente, in sandy arroyo bed, *R. Moran 30265* (CAS, SD); 11 April 1982, 4 km east of Agua Grande & 15 km NW of San Vicente, in grassy clearing, *R. Moran 30403* (SD); 19 April 2013, Reserva Natural de Valle Tranquilo: between San Quintin and El Rosario; in Arroyo Hondo, approximately 5 miles east of Mex. Hwy. 1, *J. Rebman 25997b, S. Vanderplank, J. Riley* (SD); 23 March 1998, Playa Seca, south of Cataviña and north of Laguna Chapala, along the east side of Mex Highway 1., *J. M. Porter 11615, L. E. Machen*. (CAS, SD); 28 May 1983, Sierra de Juarez, Laguna Hanson, Constitucion National Park, north end of the lake on sandy marsh delta & wet margins of the lake, *R. F. Thorne 55811, W. Wisura, W. Steinmetz, et al.* (CAS, SD); 16 April 1984, East shore of Laguna Hansen., *A. Romspert s.n.* (CAS, SD); 9 May 1985, S of El Condor: 0.5 –2.3 miles sout, *R. F. Thorne 60600, W. Wisura* (MEXU, SD).

19.2 ***Astragalus didymocarpus*** Hook. var. ***dispermus*** (A. Gray) Jeps., Fl. Calif. 2(4): 376–377. 1936

Type:—USA, Arizona, Wickenburg, *Palmer 2 1876* (holotype: GH 00058717 digital image!

Astragalus dispermus A. Gray, Proc. Amer. Acad. Arts 13: 365–366. 1878.—*Hesperastragalus dispermus* (A. Gray) A. Heller, Muhlenbergia 1(8): 137. 1906.—*Astragalus dispermus* A. Gray var. *albus* L. E. James, Contr. Duddl. Herb. 4(4): 68. 1951.

Characteristics as in the key. Sometimes the teeth red or red-purple, contrasting with the white trichomes.

Distribution:—From La Rumorosa and Sierra Juárez to the lower parts and middle atitudes in the sierra San Pedro Martir to Cataviña. Barneby (1964) report this species from southern from Arizona bordering Sonora, but. There is no available herbarium material to ensure that the variety is distributed in Sonora, although we can presume that the proximity in Arizona could extend to Sonora (Fig. 5).

Habitat:—Sandy, clayey, gravel and granitic soils; boulder fields; stony slopes and alluvial fans; soils with exposed parental rock; in intermittent streams; in different associations of desert scrubland with creosote bush, mezquite, maguey, cirio, columnar cacti, jojoba; chaparral communities and juniper-pine forest; also in burned or thinned areas, 610–2000 m.

Comments:—From the three varieties of this species, this is the one with the widest distribution in Baja California.

Specimens examined:—BAJA CALIFORNIA: 3 April 1998, Cataviña boulder fields: ca. 5 miles N of Cataviña and 0.6 miles west of Hwy. 1, *J. Rebman 4993* (BCEMX, CAS, SD); 10 May 1991, 9 miles south of Rte. 3 on road to Mike's Sky Ranch and Parque Nacional Sierra San Pedro Martir, *J. P. Rebman 1087, K. Rice* (NY); 28 April 1978, Rd to El Alamo ca. 53 mi SE of Ensenada, w side of Sierra Juarez, *C. Cagle 2720, B. Ertter, C.R. Broome* (NY); 8 May 1985, S of La Rumorosa: 3 km S of La Rumorosa, Ejido Gustavo R. V. Centro Recreativo Familiar, *R. F. Thorne 60442, W. Wisura* (NY); 9 May 1985, S of El Condor: 0.5–2.3 miles south, *R. F. Thorne 60600, W. Wisura* (BCMEX, NY); 29 March 1985, Along the old dirt peninsular highway, parallel to Hwy 1, 5.5–6.6 mi. north of Catavina, *A. C. Sanders 5480, E. Rodríguez, J. West et al.* (NY); 15 May 1977, Sierra Juázez, 5 km W of La Rumorosa, *R. Moran 24075* (CAS); 14 May 1948, One-year-old burned over granitic hillsides 16 miles southeast of Tecate, *I. L. Wiggins 11821* (CAS); 12 May 1941, In granitic soil on hillside at Los Emes southern part of Sierra San Pedro Martir, *I. L. Wiggins 9890* (CAS, US); 22 April 1962, 1.5–2.5 miles upstream from Rincon, 4.5 miles northeast of Santa Catarina, 64 miles southeast of Ensenada, *R. E. Broder 726* (CAS, MEXU, US); 21 April 1962, *R. E. Broder 653* (CAS); 5 April 1973, 15 miles S of San Agustin., *H. Gentry 2315, B. Gentry* (US); 10 April 1931, Rosario Wash., *I. L. Wiggins 5245* (TEX-LL, US); 18 May 1986, Ensenada, *G. A. Levin* 1690*, C. Brey, R. P. Levin* (MEXU, SD); 16 March 1963, Rancho las Lagunitas, near the pond, *R. Moran 126911/2* (CAS, SD); 21 April 2004, Sierra La Asamblea: northeast of El Crucero (junction of Hwy. 1 & the road to Bahia de Los Angeles), granitic mountains NW of Rancho San Luis; red clay/granitic flats along the trail between the ranch and the camp called Datililllo *J. Rebman 9911, M. Salazar, H. Riemann, B. Vinton* (SD); 20 March 2010, 24 km NW by air from turn off of Highway 1 to Bahia de los Angeles., *B. T. Wilder 10-140, J. Rebman, I. A. Happle, S. I. Enciso* (SD).

19.3 ***Astragalus didymocarpus*** Hook. & Arn. var. ***obispoensis*** (Rydb.) Jeps., Fl. Calif. 2(4): 376–377. 1936

Type:—USA, California, San Luis Obispo, *6 May 1882, Jones 3229* (holotype (fragment): NY 0011962 digital image!).

Hesperastragalus obispensis Rydb., Bull. Torrey Bot. Culb 53(3): 167–168. 1926.—*Astragalus dispermus* A. Gray var. *obispensis* (Rydb.) Tidest., Proc. Biol. Soc. Washington 50(7): 21. 1937.

Characteristics as in the key. *** *R. Moran 23068* (CAS).

Distribution:—From La Rumorosa to San Quintín and west of the Cerro Matomi. Also in south of California, Los Angeles to San Diego into the USA (Fig. 5).

Habitat:—Granitic, clay and gravelly soils; stony clay soil; small dry meadows; plains; valleys and mountain slopes; cleared and burned areas; open rocky slopes; terraces with scattered mezquite, jojoba, cacti; common with creosote bush; areas with juniperus-ine and Juniper-oak with non-thorny shrubs; cleared areas with weeds; sandy soils nea streams; grassland, open chaparral and desert scrubland; 300–1700 m.

Comments:—This is the variety with the largest flowers.

Specimens examined:—BAJA CALIFORNIA: 13 April 2001, *J. Rebman 7241* (BCMEX); 10 July 1884, Baja California, *H. C and C. R. Orcutt 1129* (NY); 12 April 1882, Valley of Palms, *M. E. Jones, s.n.* (NY); 27 May 1979, Sierra Juárez, 1.5 km NW of El Mezquite, *R. Moran 27429* (NY, SD); 9 May 1985, S of El Condor: 0.5–2.3 miles south, *R. F. Thorne 60600, W. Wisura* (CAS); 1 April 1962, Near Kilometer 142.5, 7.5 miles north of Santo Tomás, *P. H. Raven 17051* (CAS); 9 April 1973, Valley 1 mile north-west of El Pedregoso, *R. Moran 20385* (NY); 15 May 1977, Sierra Juáez, 5 km W of La Rumorosa, *R. Moran 24075* (NY); 8 May 1982, Sierra Juarez, 2 km SSE of El Cóndor, open stony ground, *R. Moran 30582* (CAS, SD); 9 May 1982, Sierra Juarez. 2 km west of El Retiro and 11 km +/- SW of La Rumorosa, *R. Moran 30636* (CAS, SD); 3 May 1976, *R.* Sierra San Pedro Martir, west slope of Cerro Blanco,

Moran 23077 (CAS, SD); 3 May 1976, Sierra San Pedro Martir, Llano el Conejo, 7 km SW of San Antonio, *R. Moran 23068* (CAS, ENCB, NY, SD); 2 May 1976, *R. Moran* Sierra Juarez, north slope of Cerro Taraizo, southernmost peak of range, in semishade, *23016* (CAS, SD); 22 June 1980, Sierra Juarez, 4 km NNW of Los Pantalones, *R. Moran 28878* (CAS, SD); 24 May 1975, Sierra Juarez, El Progreso, *R. Moran 22032* (ENCB, NY, SD); 13 May 1982, Cañón la Presa, 25 km SE of Tijuana, on open steep south slope, *R. Moran 30679* (CAS, SD); 1 April 1979, South side of Valle las Palmas above La Esperanza, on terrace *R. Moran 26862* (CAS, SD); 14 April 1979, Sierra Juarez, on rocky SE slope, 2 km NNE of Jacumé, *R. Moran 26985* (CAS, SD); 14 April 1979, Sierra Juarez, 1 km SW of El Fierro & 5 kn SE of Jacumé, *R. Moran 27005* (CAS, MEXU, SD); 15 April 1979, Sierra Juarez, 0.5 km south of El Condor, in cleared area, *R. Moran 27026* (CAS, SD); 28 May 1979, Sierra Juarez, 6 km SE of San Pedro, in small dry meadow, *R. Moran 27512* (CAS, SD); 2 June 1975, San Isidoro, in sandy soil near stream, *R. Moran 22326* (CAS, SD); 30 May 1982, Sierra Juarez, Rancho San Francisco, 6 km south of La Rumorosa, in broad sandy arroyo, *R. Moran 30818* (CAS, SD); 3 May 1976, El Coyote, in openings, *R. Moran 23084* (CAS, ENCB, NY, SD); 19 April 1980, 7 km SSW of Ojos Negros, cleared field, valley floor, *R. Moran 28262* (CAS, NY, SD).

20. ***Astragalus diphacus*** S. Watson, Proc. Amer. Acad. Arts 17: 342. 1881–82

Type:—MEXICO, San Luis Potosi, San Miguelito Mountains, *1876, Schaffner 816* (holotype: GH 00059411 digital image!; isotype: NY 0005379 digital image!).

Hesperastragalus diphacus (S. Watson) Rydb., Bull. Torrey Bot. Club 53(3): 166. 1926.

Perennial. Stems up to 45 cm long, commonly decumbent or prostrate, but occasionally the distal parte erect; tiny strigose, the trichomes 0.15–0.4 mm long, appressed. **Stipules** 1.3–4.5 mm long, semi to completely clasping, not connate, triangular to lanceolate. **Leaves** 2–9 cm long; leaflets 9–25, 2–12 mm long, linear or oblanceolate, obtuse apically, mucronate, glabrate o subglabrate abaxially. **Peduncles** 3–13 cm long, incurved, humistrate with age, when fruit ripen; the racemes up to 8 cm long, dense, flowers 10–20, soon deflexed. **Flowers** yellow-cream, purple, green-purple, the wings and keel red-violet, banner with red-violet veins; the calyx 4–5.8 × 2–2.5 mm long, strigose, commonly with black trichomes or mixed with white trichomes, rarely, the white ones denser, the tube 2.5–3.3 mm long, the teeth 1.3–2.8 mm long, subulate; the banner 7–9.8 × 3.5–5.9 mm, recurved, ovate, obovate to rhombic, briefly retuse; the wings 7–10 × 1.5–2.5 mm, the claw 2.2–3.3 mm long, the blade 4.7–7.1 mm long; the keel 5.1–6.9 × 1.8–2.7 mm, the claw 2.3–3.4 mm long, the blade 3–4 mm long, obovate. **Pod** 5–9.3 × 5–7.7 mm, sessile, ascendant, spreaded or deflexed, sub-globose, rarely oblong to elliptic or wider than long, inflate, stiff, constricted and forming two similar cavities, always retuse at both ends, and, a minute mucron at distal end, sulcate in both sutures, the valves thin papery but leathery with age, minutely strigose, yellowish, reddish to green, becoming black when aging, slightly or evidently reticulate; ovules 8–18; seeds 1.6–2.3 mm long, olive-green to brown, sometimes with purple tones.

Distribution:—Endemic to Mexico; restricted to the north of Mexico. Nuevo León (Galeana), Durango (Súchil and Vicente Guerrero), San Luis Potosí (San Luis Potosí, Villa de Reyes, Charcas and Villa de Arriaga), and Zacatecas (Zactecas City, Guadalupe, Ojo Caliente and Sombrerete) (Fig. 6).

Habitat:—Gravel, and calcareous, deep to shallow soils; arid grasslands of navajita; desert scrubland; abandoned cultivated areas; oak-pine forest; oak scrubland; oak forest with acacia*;* oak-forest; semi-arid pine forests; pine-juniper forest; plains with open vegetation, degraded grazing slopes; grass-Juniper associations; thorny scrublands; desert scrub; oak scrublands; Pine-Juniper forests; pine-oak-walnut association; abandoned farming fields; 1850–2400 m.

Comments:—Particular species to group a set of characteristics in a pod, inflate, rigid, somewhat compressed dorsally, sometimes wider than longer, retuse at both ends and minute mucronate at distal sinus. No other species of *Astragalus* presents this set of characters in a single pod.

Specimens examined:—COAHUILA: 15 July 2018, *E. Estrada 22926* (CFNL). **DURANGO**: 22 September 1982, Km. 8 Carretera V. Guerrero-Súchil, *M. González E. 1054* (CIIDIR, IBUG, IEB, MEXU); 31 July 1984, Súchil, Mirador El Fortín, cercanías, por salida de El Pedernal, , *S. González 2905* (CIIDIR, IBUG); 13 August 1984, *S. González 2915, S. Acevedo* (CIIDIR, IEB); 13 July 1990, Predio las Bayas de UJED, 93 km al S de Durango, *S. González 4499, A. García* (CIIDIR, MEXU); 22 July 1990, MpIo. De Súchil, San Juan de Michís, camino a Piedra Herrada, Reserva de la Biosfera La Michilía, *S. González 4618, R. Spellenberg* (CIIDIR, IEB, MEXU); 25 July 5-VIII 1906, Otinapa, *E. Palmer 394* (NY); 31 July 1984, mpIo. Súchil, Mirador el Fortín, *S. González 2905* (CFNL, CIIDIR); 22 July 1990, Ca. 20 air km SSW of Vicente Guerrero on road to San Juan de Michilia, 7 road mi. S of Suchil, 1/4 mi. N of Mirador El Fortin, *R. Spellenberg 10268, S. González* (MEXU, NY); 15 August 1959, 54 miles southeast

of Durango, *U. T. Waterfall 15559* (NY). **NUEVO LEÓN**: 16 July 1987, 1 km al NO del Ejido San José, La Joya, *E. Estrada 1239* (MEXU, NY); 30 June 1991, Ejido El Orito, Galeana, *E. Estrada 2027, J. Fairey, C. Schoenfeld* (IEB, NY); 15 May 2003, 2 km de San Ildelfonso, Galeana, *E. Estrada 15646* (CFNL, MEXU); 2 June 2000, Sierra Madre, Rincón del Jardín, camino Los Lirios-Laguna de Sánchez, cerca del límite con Coahuila, *J. A. Villarreal 9010, M. A. Carranza, I. Ramírez* (ANSM); **SAN LUIS POTOSÍ.** 1879, Ex convalli San Luís Potosí, *J. G. Schaffner* (NY); 13 September 1961, Puerto de la Huerta Carretera SLP-Rio Verde, *A. Gómez 380* (NY); 8 November 1963, 2 miles east of Sombrerete, *H. D. Ripley 13460, R.C. Barneby* (NY15 August 1959, 11 miles northwest of Sombrerete *U. T. Waterfall 15565* (NY); VII August 1934, San Luis Potosi, Charcas, Mexico, *C. L. Lundell 5123* (TEX-LL, US); 1989, Las Terrazas del Cono, Ejido Nuevo Centro de Población de la Paz, Mpio. Salinas, *A. Gómez s.n.* (IEB). **ZACATECAS**: 8 July 1971, Along Mexico Highway 49 below San Francisco los Flores, a small village south of the highway about 8.5 miles northwest of Sombrerete, the road to San Francisco being opposite the one to Providencia, about 1 mile south of Mexico Highway 49, *J. L. Reveal 2670, W. J. Hess, R. W. Kiger* (NY, TEX-LL, US); ; 20 August 1974, Just west of the city of Zacatecas, *R. W. Spellenberg 3803, J. Syvertsen* (ENCB, NY, TEX-LL); 5 September 1975, Along the highway immediately W of Cd. Zacatecas, *R. Spellenberg 4074, J. Willson, T. Feather* (ENCB, NY); 17 October 1965, S end of Sierra Papanton, e. of El Calabazal, *H. D. Ripley 14153, R. C. Barneby* (NY); 6 November 1963, About the city of Zacatecas, *H. D. Ripley 13453, R.C. Barneby* (NY); 25 October 1888, Hills of Zacatecas, *C. G. Pringle 1753* (NY); 8 November 1963, 2 miles east of Sombrerete, *H. D. Ripley 13460, R. C. Barneby* (NY, US); 15 August 1959, 11 miles northwest of Sombrerete, *U. T. Waterfall 15565* (NY); 9–11 October 2005, La Jaula de Abajo, nopalera silvestre, Mpio. De Pinos, *L. A. García-R. 1382* (IBUG).

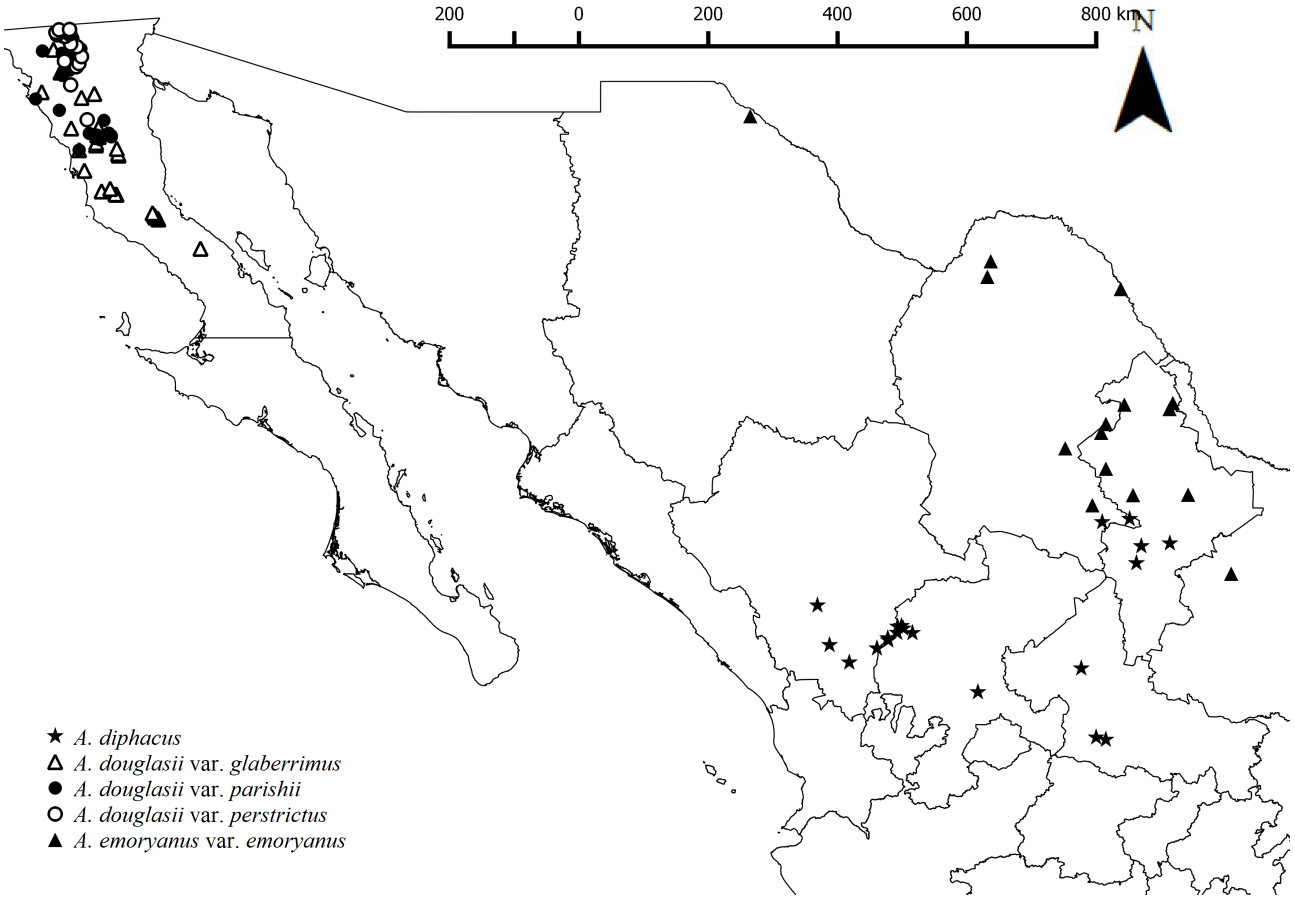

FIGURE 6. Map showing the distribution of *Astragalus diphacus, A. douglasii* var. *glaberrimus, A. douglasii* var. *parishii, A. douglasii* var. *persitricuts,* and *A. emoryanus* var. *emoryanus* in Mexico.

21. ***Astragalus douglasii*** (Torr. & A. Gray) A. Gray, Proc. Amer. Acad. Arts 6: 215. 1864

Phaca douglasii Torr. & A. Gray, Fl. N. Amer. 1(2): 346. 1838; *Tragacantha douglasii* (Torr. & A. Gray) Kuntze, Revis. Gen. Pl. 2: 944. 1891.

Astragalus tejonensis M. E. Jones, Proc. Calif. Acad. Sci., ser. 2 , 5(18): 644–645. 1895; *Astragalus douglasii* var. *tejonensis* (M. E. Jones) M. E. Jones, Contrib. W. Bot. 10: 61. 1902; *Phaca tejonensis* (M. E. Jones) A. Heller, Muhlenbergia 2(18): 85. 1905.

Phaca vallicola Rydb., N. Amer. Fl. 24(6): 343. 1929.

Phaca megalophysa Rydb., 24(6): 344–345. 1929.—*Astragalus douglasii* (Torr. & A. Gray) A. Gray var. *megalophysa* (Rydb.) Munz & McBurney, Bull. S. Calif. Acad. Sci. 31(2): 65. 1932.

Perennial. **Stems** up to 1 m long, erect, suberect, decumbent or postrate but ascending distally, occasionally branched from the base; pubescence scattered or dense, middle an upper parts with trichomes up to 0.6 mm long, straight or somewhat appressed, glabrate o almost so basally. **Stipules** 1.4–6.6 mm long, lanceolate to triangular, semi or completely clasping, not connate. **Leaves** 5–18 cm long; leaflets 7–25, 5–34 mm long, linear, oblong, oblanceolate, obtuse, truncate to retuse, mucronate, rarely acute, dorsally carinate, with evident midrib, glabrous in both surfaces or glabrous adaxially only and pubescent abaxially, pubescent in both faces, but always denser adaxially, the pairs frequently distant to each other. **Peduncles** 2.3–13.5 cm long; the racemes up to 17 cm, flowers 8–38 ascendant or spreading. **Flowers** white-yellowish **(**ochroleucos), green-white to yellowish, greenish-yellow, dull yellow (reddish in bud)*, immaculate; the calyx 4–8 × 2.5–3.6 mm, papery, the tube campanulate to ovoid, 2.4–4.2 mm, scarce to dense strigose, invested with white or rarely and completely with black ones, the teeth 0.9–4 mm long, triangular to subulate; the banner 6.3–13.3 × 6–10.3 mm, recurved; the wings 5–11.7 ×7.9–10.9 mm, the claw 2.4–4.2 mm long, obtuse, obovate; the keel 6.2–11 × 2.3–3 mm, the claw 2.3–4.4 mm long, the blade 4.7–6 mm long, triangular, incurved. **Pod** 2.4–6 × 1.2–3.5 cm, spreading or humistrate when fruits ripen, regularly sessile, rarely tiny but imperceptibly elevated in the receptacule, inflated bladder-shape, elliptic, straight, basally rounded, dorsally gibous-convex, ventrally convexed, distally abruptly contracted in a short flattened, incurved, 2–8 mm long beak, the valves thin, light-green, light-brown or with purple spots, strigose, glabrate or subglabrate, lustrous; ovules 22–78; seeds 2.3–3 mm long, brown to reddish-brown.

Distribution:—In Mexico restricted to Baja California, from La Rumorosa, Sierra Juárez, Sierra San Pedro Mártir to Cataviña. Also, in California (USA).

Comments:—Morphologically, the three varieties are quite similar, but they can can be discerned based on the type of pubescence on pod and stems growth habit.

1. Ovary and pod glabrate; ovules 36 or less..... var. *glaberriumus*
- Ovary and pod strigose, rarely glabrous, if glabrous, ovules 40 or more.....2
2. Stems and peduncles erect; pods no humistrate .....var. *perstrictus*
- Stem diffuse; peduncles incurved, distally ascendant; pod humistrate ..... var. *parishii*

21.1 ***Astragalus douglasii*** **(**Torr. & A. Gray) A. Gray var**.** ***glaberrimus*** M. E. Jones, Proc. Calif. Acad. Sci., ser. 2, 5(18): 645. 1895

Type:—MEXICO, Baja California, Las Huevitas, *1889, Brandegee s.n.* (holotype CAS 0000759 digital image!).

Phaca glaberrima (M. E. Jones) Rydb., N. Amer. Fl. 24(6): 345. 1929.

Stem diffuse, decumbent, rarely ascendant distally, up to 70 cm long. **Pod** 2.8–5.5 × 1.5–2.5 cm, glabrate; ovules 22–36.

Distribution:—Distributed between geographical coordinates 31°–29°20’N–114°10′–115°40’W, from El Coyote, Buenavista, El Sauzalito, Rosario, through Sierra San Pedro Mártir, Valladares, Santa Cruz, El Cartabón, El Progreso, San Agustín, San Pablo, Santa Teresa, Buenavista, San Roque, Cataviña to Calamajué, into Vizcaino Desert. Sympatric with var. *parishii* between 30°40’N–115°15’W (Santa Cruz y El Potrero). Variety endemic to Mexico (Fig. 6).

Habitat:—Arid and dry slopes; wet sandy flood palins; alluvial plains; granite boulders, gravel and granitic soils; sandy areas of intermittent rivers; *Pinus* forest associated with arid shrublands with creosote bush, boojum tree, mezquite, jojoba, Josua tree, columnar cacti,prickle pear; crassicaul scrubland, also in jefreyi pine forests; oak forest; burned areas with scrbs and oak; riparian flora with willow, palms, salt cedar, small columnar cacti, California jointfir, boojum tree, creosote bush associations; 75–2100 m.

Specimens examined:—BAJA CALIFORNIA: 15 April 2000, Rancho Los Martires Area: along river zone, *J. Rebman 6421* (BCMEX, CAS, SD); 16 February1998, 10 km north of Catavina on Mex-, *T. R. Van Devender 98-149, M. C. Penalba, J. L. Betancourt* (NY); 17 September 1930, Banks of La Sanca creek, about 5 mi. NW. of La Grulla, Sierra San Pedro Martir, *I. L. Wiggins 4867, D. Demares* (CAS, NY, US); 13 April 1931, Between San Agustin and Rancho Cataviña, *I. L. Wiggins 5319* (CAS, NY, US); 7 March 1930, 5–10 miles North of Cataviña, *I. L. Wiggins 4400* (CAS, NY, TEX-LL); 4 June 1963, Sierra San Pedro Mártir, Santa Eulalia, *R. Moran 11147* (NY, SD); 18 March 1984, Just N of Cataviña, *D. E. Breedlove 60776* (CAS, NY, TEX-LL); 2 March 1963, Baja California , North side of Cerro San Luis, *R. Moran 10310, J. Henrickson* (CAS, NY, SD); 7 May 1973, 8 miles NW of Sauzalito, *R. Moran 20892* (MEXU, NY, SD); 4 June 1976, Sierra San Pedro Mártir, 2 km west of Rancho Santa Cruz, *R. Moran 23448* (NY); 11 March 1999, 1 km al N de Cataviña sobre la carretera a Tijuana, *J. L. Panero 7410, B. Crozier, S. González, J. I. Calzada* (NY, TEX-LL); 3 January 1988, Vado El Palmarito 2.8 miles north of Santa Ines junction with Mexico Federal Highway 1, *M. A. (Ben) Franklin 5788* (NY); 21 September 1980, 3 miles north of Catavina and ¼ mi. east of highway, *A. C. Sanders 2029, K.R. Neisess, J. West* (NY); 25 May 1974, Rte. 1, ca. 54 mi S of El Rosario, *Reeves, Hensel, McGill, D. Pinkava 12198.* (NY); 12 May 1991, 1.8 miles north of km marker 110 of Rte. 3 on the road to Ejido Jamau, *J. P. Rebman 1115, K. Rice* (NY); April 1958, 17.6 km north of Rancho Cataviña, *P. H. Raven, M. Mathias, J. Turner 12596* (CAS); 5 March 1947, Cataviña, *H. S. Gentry 7341* (CAS); 29 May 1961, Growing among boulders along creek, at Santa Catarina, 64 miles southeast of Ensenada, *R. F. Broder 509-A* (CAS, MEXU, US); 22 March 2010, Ca. 35 km east of El Rosario by air and ca. 5.0 km N by air of Highway 1, *B. T. Wilder 10-247, J. P. Rebman, I. A. Happle, S. I. Enciso C.* (CAS, SD, USON); 9 June 2016, East of San Quintin in the foothills of the Sierra de San Pedro Martir: vicinity of Rancho Santa Eulalia, *J. Rebman 31681, S. Vandreplank, A. Harper* (CAS, SD); 2 March 2016, Arroyo Portrero tributary of Arroyo El Rosario, *J. Riley 410, S. Alfaro* (CAS, SD); 31 March 1977, ca. 4 miles northwest of Catavina in sandy wash, *G. L. Webster 21728* (CAS, SD); 12 August 1998, Sierra San Pedro Martir: 1.1 miles southeast of Mike's Sky Ranch along Rio San Rafael, *J. Rebman 5552* (CAS, SD, MEXU); 3 April 1998, Cataviña boulder fields: ca. 5 miles N of Cataviña and 0.6 miles west of Hwy. 1, *J. Rebman 4992* (CAS, SD); 5 July 1969, Sierra San Pedro Martir; Arroyo Santa Cruz, 1.5 miles west of Rancho Santa Cruz, *R. Moran 16299* (CAS, SD); 17 June 1939, Santa Maria Arroyo, *C. F. Harbison n.n* (CAS, SD); 18 October 1980. Los Zaguaritos, Rio San Rafael., *R. Moran 29401* SD); 12 June 1979, Santa Ines Study Site, 9 km NW of Rancho Santa Ines, *W.H. Clark 3118* (MEXU); 20 July 1988, Sierra San Pedro Martir, near La Corona de Abajo, 0.75 mi up main road from entrance gate, *S. Boyd 2794, T. Ross* (MEXU); 29 May 1982, 40 miles E of the junction of this orad to Mex. Hwy. 1, *P. Gallagher 82-101* (ENCB).

21.2 ***Astragalus douglasii*** (Torr. & A. Gray) A. Gray var. ***parishii*** (A. Gray) M. E. Jones, Contr. W. Bot. 8: 6. 1898

Type:—USA, San Diego, San Jacinto Mountains, *June 1882, S. B. Parish & W. F. Parish 1407* (holotype: not found; isotype: *S. B. Parish & W. F. Parish 1407* OSC 0000533 digital image!, CAS0027720 digital image!, *S. B. Parish & W. F. Parish 1913* YU001448 digital image!; lectotype: *S. B. Parish & W. F. Parish 1407* GH00058861; isolectotype: *S. B. Parish & W. F. Parish 1407* BM001042739 digital image!, F58916F digital image!, *S. B. Parish & W. F. Parish 1407a* NA0095870 digital image!; syntype: *S. B. Parish & W. F. Parish 605* GH 00058864 digital image!, *S. B. Parish & W. F. Parish 1233* GH 00058862 digital image!, *S. B. Parish & W. F. Parish 402* GH00058863 digital image!

A. parishii A. Gray, Proc. Amer. Acad. 19: 75. 1883.—*Phaca parishii* (A. Gray) Rydb., N. Amer. Fl. 24: 344. 1929.

Phaca pseudocarpa Rydb., N. Amer. Fl. 24(6): 343. 1929.

Phaca topoensis Rydb., N. Amer. Fl. 24(6): 343. 1929.

Stems diffuse; peduncles ascendant distally; pod 2.5–4.5, minute strigose, humistrate.

Distribution:—Distributed further north than the previous variety, from northern end, in La Rumorsa between Mexicali and Tecate, to south, through Santo Tomás, San Vicente, Sierra Juárez, Sierra San Pedro Mártir, San Salvador, La Cieneguita, El Coyote, El Florido, El Topo, Vallecitos to Santa Cruz and El Potrero (associated in the latter two locations with var *glaberimus*). Also, in south of California (USA) (Fig. 6).

Habitat:—Dry slopes; sandy, granitic, gravelly, and stony soils; dry sands on arroyo beds; grasslands near the road; rocky flats and slopes; saltbush scrub; associations of willow-oak-pine-fir-poplar forest; chaparral and burned chaparral; pine-oak forests with oak, pine and sumac; roadside weed; pine-juniper forests, 900–2700 m.

Speciemns examined:—BAJA CALIFORNIA: 1 June 1996, Corte Madera Ranch, south of Pine Valley, *J. Rebman 3195* (BCMEX); 21 May 1997, West of Jacumba, south of old Hwy 80, between boulevard and Jacumba, ,

J. P. Rebman 4067 (BCMEX); 3 September 1966, Sierra Juarez;2.5 miles east of Rancho San Pedro, *R. Moran 13457* (NY, SD); 12 November 1983, Ca. 2 mi. S of La Rumorosa, *R. F. Thorne 57423, W. Wisura* (NY); 19 April 1985, San Salvador: bridge over branch of Rio San Carlos near Rancho San Salvador, *R. F. Thorne 60092, D. Charlton* (NY); 26 May 1987, Sierra de Juarez: Parque Nacional Constitucion de 1857, Laguna Hanson, *R. F. Thorne 62379, A. Strid, K. Tan, F. Ehrendorfer, Liston* (MEXU, NY); 29 November 1987, Parque Nacional Sierra San Pedro Martir. Vallecitos, *MA (Ben) Franklin 5677, J. Chandler* (NY); 31 May 1970, Ca. 1 mile NE of Rancho el Florido, *R. Moran 17732* (NY, SD); 1 June 1976, Sierra San Pedro Mártir, El Coyote, *R. Moran 23357* (MEXU, NY, SD); 29 June 1962, 3 miles north of El Topo, Sierra Juarez, *R. Moran 9808* (NY, SD); 1 July 1962, About 7 miles west of La Romarosa near road between Tecate and Mexicali, *I. L. Wiggins 459, J. H. Thomas* (CAS, ENCB, NY); 30 June 1962, 9 May 1985, S of La Rumorosa: 4. 2 miles south on road to Laguna Hanson, *R. F. Torne 60534, W. Wisura* (CAS, MEXU); 26 May 1950, Laguna Hansen, Sierra Juarez, *R. Moran 3426* (CAS); 31 May 1952, El Topo, *C. F. Harbison s.n.* (CAS, SD); 15 July 1903, San Pedro martir Mountains, *E. A. Goldman 1224* (US); 1 July 1962, About 7 miles west of La Romarosa near road between Tecate and Mexicali, *I. L. Wiggins, J. H. Thomas 459* (US); 18 September 1977, Sierra San Pedro Martir; in shallow valley southeast of El Picacho, *R. Moran 24856* (CAS, SD); 27 September 1978, Arroyo Santo Domingo, 3.0 km east of Santo Domingo, *R. Moran 26350* (CAS, NY, SD); 26 May 1979, Sierra Juarez; 2.5 km south of El Condor, *R. Moran 27352* (CAS, SD); 31 May 1976, Sierra San Pedro Martir; northwest of La Joya, on Valladares Creek, *R. Moran 23331* (CAS, SD); 7 September 1980, Sierra Juarez; 7.0 km east of La Huerta, *R. Moran 29215* (CAS, SD); 28 June 1981, Sierra Juarez; 2.0 km southeast of San Faustino, *R. Moran 29679* (SD, TEX-LL); 10 April 1982, Los Alamitos, 6.0 km northeast of San Vicente, *R. Moran 30322* (CAS, SD); 26 May 1956, 15 miles south of Tecate-Mexicali Highway on road to Tajo Canyon, *D. F. Howe 2541* (CAS, SD); 20 June 2007, Sierra Juarez, between El Topo and Laguna Hanson: Rancho Rodeo del Rey; NE part of the Ranch, *J. Rebman 13580* (SD8 May 1994, Pinus jeffreyi forest N of Laguna Hanson, *G. L. Webster 30906* (SD); 23 March 1951, 19 miles north of Laguna Hansen., *E. B. Higgins s.n.* (SD); 10 June 1933, Laguna Hanson, *F. F. Gander 2632* (SD); 28 July 1970, Sierra San Pedro Martir: Arroyo SSE of Oak Pasture, *R. Moran 17967* (SD); 7 July 1968, Sierra San Pedro Martir: Rancho Concepcion, *R. Moran 15300* (NY); 4 July 1965, Sierra Juarez; Rancho El Topo, *C. F. Harbison s.n.* (SD); 19 July 1988, Sierra San Pedro Martir, Meadows along road heading south of Ballecitos towards La Encantada, base of Cerro Botella Azul, *S. Boyd 2656, S. Meury, A. Liston* (MEXU); 18 May 1986, 33½ km SE of La Rumorosa on road to Laguna Hanson, *G.A. Levin 1677, C. Brey, R. P. Levin* (MEXU).

21.3 ***Astragalus douglasii*** var**.** ***perstrictus*** (Rydb.) Munz & McBurney ex Munz, Bull. S. Calif. Acad. Sci. 31(2): 65. 1932

Type:—USA, San Diego, Hill valley between Campo and Jacumba, 28 May 1903, *Abrams 3636* (holotype (based on *Phaca persitricta*): NY01248712 digital image!; isotype: RSA 0003592 digital image!, NY01248712 digital image!, CAS0006763 digital image!, CAS0006764 digital image!, BM001042736 digital image!, US00001508 digital image!, PH00028208 digital image!).

Phaca perstricta Rydb., N. Amer. Fl. 24(6): 344. 1929.—*Astragalus parishii* A. Gray subsp. *perstrictus* (Rydb.) Abrams, III. Fl. Pacific States 2: 583. 1944.

Stems erect, up to 1 m de long; **pod** 3.5–6 cm long, the valves minute strigose, not humistrate. **R. Moran 24129* (NY).

Distribution:—In Mexico, located between 31°40'–32°25'N–115°50'–116°30'W; this variety has the smaller distribution, from Tecate, Ejido Jacumé, Valles de las Palmas, through Sierra Juárez, including El Cóndor, Laguna Hanson to El Tecolote, El Coyote and El Calabozo. Sometimes fairly common in disturbed openings. Also, in extreme southern California (USA) (Fig. 6).

Habitat:—Granitic and sandy soils; rocky hillsides; volcanic slopes; sandy arroyos; shallow slopes; cleared shallow valley; pine-juniper forest; scrublands with sagebush; oak scrub; pinyon-juniper forest; disturbed chaparral with sumac, sagebush, manzanita, jointfir; desert chaparral; sagebush and creosote bush tickets; 1000–1700 m.

Specimens examined:—**BAJA CALIFORNIA:** 20 June 2007, 14.4 miles S of El Condor and Mex. Hwy. 2, along the road to Laguna Hanson., *J. Rebman 13539* (BCMEX; SD); 29 May 1973, An estimated 25 mi. E of Tecate along Highway 2 , *R. & M. Spellenberg 3305, H. Wolfe, J. Syvertsen* (ENCB, NY); 7 June 1971, Along Rte. #2, 49.6 mi W of Jct with main Rte to Mexicale, *L. McGill, 8679, D. J. Pinkava* (NY); 29 May 1985, Sierra Juárez, 5 km south of Jacumé , *R. Moran 30811* (ENCB, NY, SD); 7 July 1979, Sierra Juarez, 2.0 km southsouthwest of La Hechicera, *R. Moran 27720* (ENCB, NY, US); 17 September 1983, Ca. 9 miles SW of Laguna Hanson, Sierra de Juarez , *R. F.*

Thorne 57120, K. Kubitzki, P. Peterson, C. Annable (NY); 3 September 1966, 2½ miles east of Rancho San Pedro, *R. Moran 13457* (NY); 15 May 1977, Sierra Juárez, 5 km W of La Rumorosa, *R. Moran 24129* (NY, SD); 17 September 1985, Ca. 9 miles SW of Laguna Hanson, Sierra de Juarez , *R. F. Thorne 57120, K. Kubitski, P. Peterson, C. Anable* (NY); Jun2 1952, about 21 miles east of Tecate along road to Mexicali , *I. L. Wiggins, J. H. Thomas 435* (CAS, NY); 21 May 1973, Valley, 2.0 miles west of Cerro Colorado, *R. Moran 20980* (CAS, SD); 30 May 1982, Sierra Juarez; Rancho San Francisco, 6.0 km south of La Rumorosa, *R. Moran 30815* (CAS, SD); 30 June 1962, 9 May 1985, S of La Rumorosa: 4.2 miles south on road to Laguna Hanson, *R. F. Torne 60534, W. Wisura* (CAS, SD, MEXU); 29 March 2013, Sierra Juárez Norte de Sierra Juárez. 1.2 km SE de Rancho Iracheta. S16, *A. Medel N. 2013-021* (SD); 28 April 2015, Vicinity of the Gabbro mountain called Cerro El Tecolote: south of Mex. Hwy 3 at Valle de la Trinidad; just southwest of General Leondro Valle; along the road in a recently burned area to the west of Cerro El Tecolote, *J. Rebman 30076* (SD); 26 May 1956, 22 miles south of Tecate-Mexicali highway on road to Tajo Canyon, *D. F. Howe 2540* (SD); 28 June 1988, Parque Nacional Constitucion de 1857: Laguna Hanson; ca. 23 miles East of Ojos Negro, *T.S. Elias 10927, D. Arias, O. Dorado* (MEXU).

22. ***Astragalus emoryanus*** (Rydb.) Cory var. ***emoryanus***, Rhodora 38(455): 406.1936

Type:—USA, Texas, El Paso, 1 January 1852, *C. Wright s.n.* (holotype (under *Hamosa emoryana*): GH 00058725 digital image!; isotype: US 01108182 digital image!, NY 00011919 digital image!, MO 2196410 digital image!).

Hamosa emoryana Rydb., Bull. Torrey Bot. Club 54(4): 327. 1927.

Astragalus monterreyensis Rydb., Bull Torrey Bot. Club 54(4): 326. 1927.

Annual or **bienal**. **Stems** prostrate, creeping, with radial or sub-dradial growth; minute strigose or villous, the trichome up to 1 mm long, appressed. **Stipules** 1.5–5.5 mm long, triangular to ovate, glabrate o with scattered trichomes, semi or completely clasping, not connate. **Leaves** 1–8 cm long, leaflets 7–21, 2–14 mm long, nearly adjacent to each other, obovate, oblanceolate, retuse or truncate apically, pubescent adaxially and abaxially, only marginaly pubescent or subglabrate adaxially. **Peduncles** 1–10 cm long; the racemes 0.3–3.5 cm long, flowers 1–12. **Flowers** purple, reddish-violet with white center, dark pink to pink-purple; calyx 3.6–6 × 1.5–2.8 mm, pubescent with black and white trichomes, sometimes only black ones, the tube green-purple to purple, 1.9–3.5 mm long, the teeth 1.2–2.9 mm long, subulate; the banner 6–11.4 × 5.3–9.5 mm, recurved, obovate to spathulate, occasionaly deeply retuse at apex, with a striated, pale patch on the fold; the wings 5.1–10 × 1.1–3.4 mm, the claw 1.8–2.1 mm long, the blade 3.1–6.6 mm long, oblong to oblanceolate; the keel 4.5–6.7 × 1.9–2.5 mm, the claw 1.9–3.3 mm long, the blade 2.3–4 mm long, obovate. **Pod** 12–22 × 2–3.4 mm, spreading, pendulous to ascendant when himistrate, linear to oblong, triquetrous, curved or semi-circular coiled, compressed, obtuse basally, cuspidate apically, laterally convex, dorsally openly sulcate, the valves slightly reticulate, papery, glabrate, light brown; septum complete, thence the pod bilocular or almost so, persistent in the plant until it opens; ovules 8–17; seeds 4-angular o mitten shape, olive-green, brown-light or brown, sometimes with purple tones, smooth.

Distribution:—Distributed in northern Mexico, from the northern end (and the only locality) of Chihuahua (Praxedis Guerrero), Coahuila (municipality of Múzquiz, and areas adjacent to Saltillo and Candela), north and northwest Nuevo Léon and also in northern Tamaulipas (Nuevo Laredo), in close proximity to Nuevo Leon and Laredo, Texas. Two varieties of this species are recognized. The other var. *terlinguensis* (Cory) Barneby is found locally in Texas. Also, in Texas (USA) (Fig. 6).

Habitat:—Gravelly, clayey, clay-gypsic, and calcareous soils; alluvial fans; roadside; disturbed scrubs; mesquitales; desert and crassicaul scrublands with creosote bush, acacia, mezquite,guapilla, maguey, prickle pear, granjeno, ocotillo; associations of mahogany, silktassel, juniper, ash, monilla, oak; 500–1600 m.

Comments:—Morphologically similar to *A. nuttallianus*, although in this later species the pods is pubescent (very rarely glabrous) and detach from the plant when opening.

Specimens examined:—CHIHUAHUA: 10 April 1983, Sierra San Ignacio (including and in the Sierra La Esperanza), canyon 6.5 km SSW of Esperanza, *R. D. Worthington 9745, R. Díaz* (NY, TEX). **COAHUILA:**; 15 March 1973, 3 km N of Rancho Lechuguillal, *M. C. Johston, T. L. Wendt, F. Chiang 10207* (CAS, MEXU, TEX-LL); 15 March 1973, Puerto de La Carroza (on Nuevo Leon border), *M. C. Johnston 10199, T. L. Wendt, F. Chiang* (MEXU, NY); 28 February1946, Coahuila, About 40 km southwest of Monterrey, *J. C. Johnson 16243 M. & F. A. Barkley* (NY). **NUEVO LEÓN**: 20 March 1983, La Mesa (abandonada), Lampazos, *O. Briones 1045, 1045* (ANSM), 13 March 1966, Carretera China-Monterrey, al lado de la Carretera, *I- Domínguez G, s.n.* (ANSM); km 185, carr.

Cuota Monterrey-Nuevo Laredo, 5 March 2004, *E. Estrada et al. 15945* (CFNL, CIIDIR, ENCB); 17 March 1973, Minas "Manto Blanco" y "Sabana Blanca", just N of the Cañon de Potrerillos, *M. C. Johnston 10248E, T. L. Wendt, F. Chiang* (MEXU, NY, TEX); 16 March 1973, 3 km N of Rancho Lechuguillal , *M. C. Johnston 10207, T.L. Wendt, F. Chiang* (CAS, NY, TEX-LL, MEXU); 22 March 1970, Ca. 34 mi south of Nuevo Laredo, *N. D. Atwood 2053* (NY); 22 March 1970, Ca. 34 miles south of Nuevo Laredo along hwy 85 , *L. C. Higgins 2674* (ENCB, NY); 15 April 1946, Nuevo-Leon, Monterrey , *J. Roybal 204* (US); 3 February 2001, Rancho Santa maría (CEMEX), Mpio. Lampazos, *J. J. Medellín n.n* (CFNL); October 1946, Mirador, near Monterrey, *J. J. Roybal 669* (MEXU). **TAMAULIPAS:** 15 March 1988, San Carlos, Sierra de San Carlos, ca. 5 mi S of San Carlos, N side of Bufa El Diente, *G. Nesom 6278, L. Hernández S, M. Martínez, J. Jiménez* (MEXU, TEX-LL).

23. ***Astragalus ervoides*** Hook. & Arn., Bot. Beechey Voy. 417. 1840

Perennial. Stems up to 65 cm long, prostrate, decumbent o incurved-ascendent distally; minute strigose, the trichomes up to 0.4 mm long, appressed or totally glabrate in the inflorescences. **Stipules** 1–5 mm long, semi-clasping, not connate, lanceolate to triagular. **Leaves** 2–8 cm long; leaflets 11–25, 3–13 mm long, linear, ovate, oblong, elliptic to obovate, obtuse, retuse or retuse and mucronate apically, adaxially glabrous. **Peduncles** 3–9 cm long, curved or straight; the racemes 1.5–4 cm, flowers 5–40 soon deflexed. **Flowers** white, whitish, cream, pale yellow, yellowish, yellow-greenish (almost white), sometimes the keel purple to pinkish tipped; the calyx 3.4–7.3 × 2.2–9 mm, minute strigose, the trichomes black, the tube 2.1–3.8 mm long, campanulate, purple, papery; the teeth 0.7–4.2 mm long, lanceolate, triangular-deltate to acute triangular; the banner 6.2–10.2 × 3.4–6 mm, recurved, spathulate to sub-rhombic, retuse, with lilac veins; the wings 6.6–9.9 × 1.8–2.7 mm, the claw 2.6–4.2 mm long, the blade 4.4–7.3 mm long, oblong to oblanceolate, obtuse, truncate to retuse; the keel 5.5–7.7 × 1.4–3.2 mm, the claw 2.7–3.7 mm long, the blade 3.1–4.2 mm long, obovate. **Pod** 1.1–1.8 × 0.2–0.4 cm, commonly pendulous, sessile to short stitpitate (the stipe 0.4–2 mm long, persistent in the receptacule), triquetrous, ventrally carinate, dorsally deeply sulcate, laterally almost flattened or narrow angulate to obtuse, linear to narrow elliptic, slightly curved, basally abruptly narrow ending in a stipe, apically ending in a triangular, curved, 1–2.5 mm long beak, the valves thin, delicately reticulate, septum complete, the pod thence bilocular; ovules 10–22; seeds 1.8–2.2 mm long, yellowish to olive-green to green-brown, sublustrous.

Endemic to Mexico. In mountains of northwestern Mexico, southwest Chihuahua, southern Durango and Sinaloa, western and southwestern Nayarit, western Jalisco and north-central and western Michoacán.

It consists of two varieties recognized based on size of the leaves, peduncles, and the calyx teeth, and also number of ovules. *A. ervoides* y *A. sinaloae* are extremely similar in most of their features, both have stipitate pods, but, can be discerned by the ovary and fruit, both pubescent of *A. sinaloae*.

1. Stems 30–65 cm long; peduncles 4–9 cm long, longer than leaves; calyx teeth deltoid to wide triangular, 0.7–1.1 mm long; ovules 10–12; south Sinaloa, Nayarit, Jalisco, Michoacán, Tlaxcala ..... ***A. ervoides* var. *ervoides***
- Stems 10–30 cm long; peduncles 3–7 cm long, shorter than leaves; calyx teeth subulate a to lanceolate, 1.2–4.2 mm long; ovules 12–21; Chihuahua and Durango, Sinaloa ..... ***A. ervoides* var. *maysillesii***

23.1. ***Astragalus ervoides*** Hook. & Arn. var. ***ervoides*** Bot. Beechey Voy. 417. 1841

Type:—MEXICO, Nayarit, San Blas to Tepic, *Sinclair s.n.* (Beechey´s Vouage) (holotype K000478289 digital image!).

Tragacantha ervoides (Hook. & Arn.) Kuntze, Revis. Gen. Pl. 2: 944. 1891.

Astragalus apertus E. Sheld., Minnesota Bot. Stud. 1(3): 166. 1894.

Astragalus hookerianus D. Dietr., Syn. Pl. 4: 1086. 1847. *Hamosa hookeriana* (D. Dietr.) Rydb., N. Amer. Fl. 24(7): 435. 1929.

Distribution:—Southern Sinaloa, southwestern Durango, southwestern Nayarit and western and central Michoacán. The distribution of both varieties overlaps in southern Durango and Sinaloa, El Palmito, Loberas, Copala and Concordia (Sinaloa), and El Salto, Las Rusias, Neveros, Huizar, El Guayabo y Los Bancos (Durango) (Fig. 7).

Habitat:—Arid mountain slopes; shallow, clayey soils; cloud forest; pine forest; conifer forest; pine-oak-madrone forest; big leaf oak forest; roadside; oak forest; glens; 1500–2880 m.

Comments:—Several different flower colors have been reported including, white, and yellowish-green (almost white).

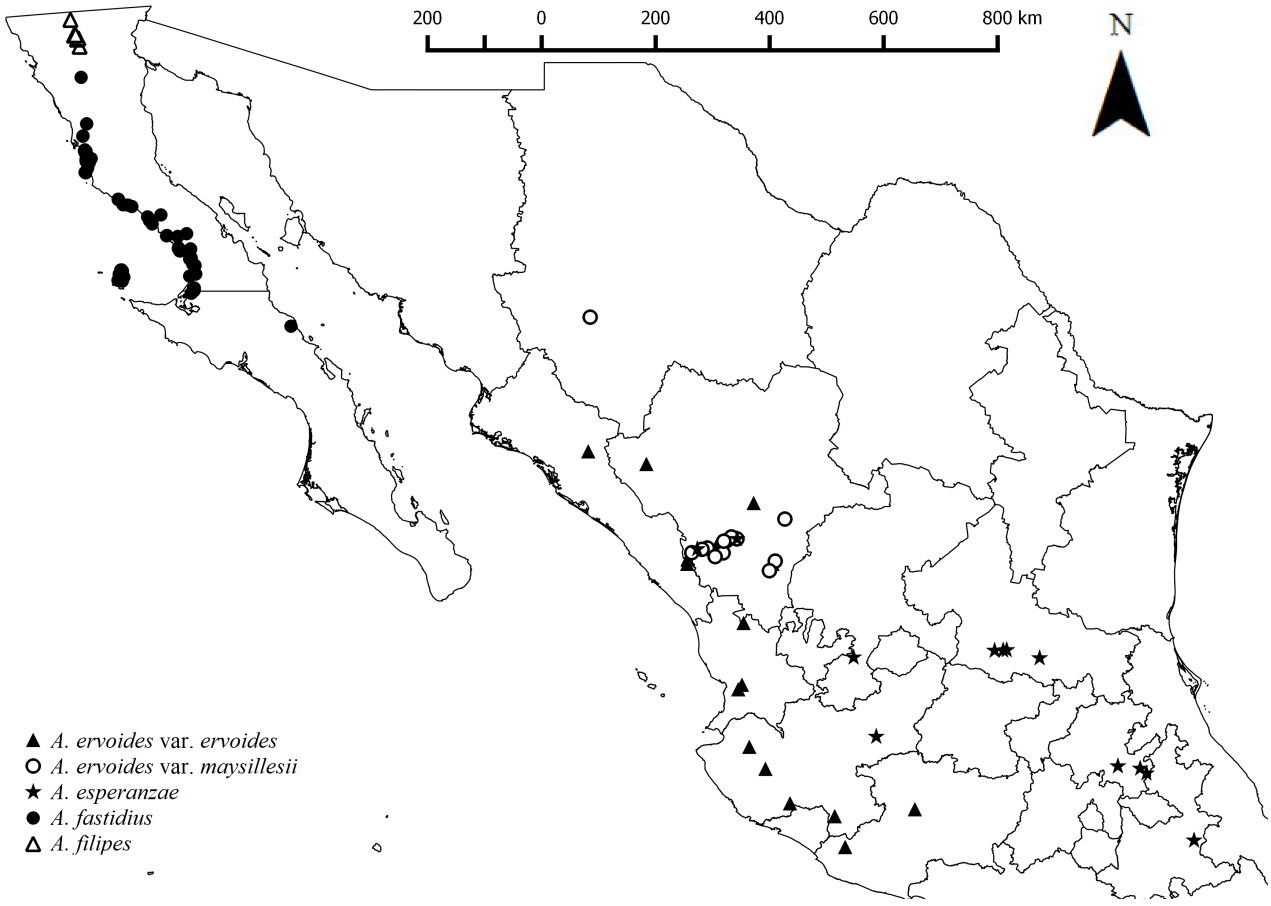

FIGURE 7. Map showing the distribution of *Astragalus ervoides* var. *ervoides, A. ervoides* var. *maysilesii, A. esperanzae, A. fastidius,* and *A. filipes* in Mexico.

Specimens examined:—CHIHUAHUA: 16 September 1983, *P. Tenorio L. 4359, R. Torres C.* (MEXU). **DURANGO:** 10 September 1985, Gavilancillo, apox. 7 km de La Guajolota, Mpio. Mezquital., *I. Solís 244* (CIIDIR, IEB); 21 July 1985, 10 Km. de Charcos por el camino a La Guajolota, *M. González 1804 et al.* (CIIDIR, MEXU); 12 August 1985, Mezquital, Cerro de Buenavista (aprox. 5 km. de La Guajolota), *I. Solis 118* (CIIDIR, MEXU); 10 August 1986, Alrededores de Santa María de Ocotán, Mpio. De Mezquital, *J. Mendía 76* (ANSM, CIIDIR); 25 July 1981, 17 km al S de El Salto, cerca del paraje La Remuda, *S. González 1763, M. González* (ANSM, MEXU); 27 July 1985, Mezquital—9 Km. de La Guajolota, *I. Solís 27* (ANSM, CIIDIR, MEXU); 21 July 1985, 6 km de los Charcos, Mezquital, Durango, *M. González 1783 et al* (ANSM); 25 August 1984, 1 km al N de Santa María de Ocotán, , Mpio. Mezquital, *M. González 1439* (ANSM, CIIDIR 9 June 1992, El Capulín, 600 m bajada El caracol-las Ventanas, Mpio. El Mezquital, *A. García 1366* (CFNL); 14 October 1996, Parque El tecuán, Mpio. Durango, *S. Acevedo 1046* (CFNL); 8 September 1997, Salto del Agua, 2 km al N, Mpio. Durango, *S. González 5983, M. González, S. Acevedo* (CFNL); 29 June 1984, Durango, Pueblo Nuevo, Lecheria, 10 km al W de El Salto, *P. Tenorio L. 6037, C. Romero de T., T.P. Ramamoorthy* (MEXU); 19 September 1985, Durango, Topia, *P. Tenorio L. 9816, C. Romero de T., J. Ignacio S., P. Dávila* (MEXU); 28 September 1990, Orillas de Topia, Durango, *O. Bravo B. 1648,* (MEXU). **JALISCO**: 22 September 1987, 29 km al W de Bolaños, caminoa Huejuquilla, *L. M. González V. 3225* (IEB); 5 November 1962, 3 miles east of San Miguel de la Sierra, road to Ayutla, *R. McVaugh 22*081, Rzedowski (CAS, MEXU, NY); 28/30 November 1959, Sierra del Halo, near a lumber road leaving the Colima highway 7 mi SSW of Tecalitlán and extending SE toward San Isidro, *R. McVaugh 1214, W. N. Koelz 674* (CAS, MEXU, NY); 1981, Camino de Talpa al Cuale, Talpa de Allende, Jalisco , *J. A. Vázquez García 1231* (IBUG); 20 October 1979, Quila, Ejido La Canada, al poniente de Tecolotlán, *A. Onofre Guijarro s.n.* (IBUG); 25 December 1985, Caminos entre El Puerto del Picacho de San Campus (un paso 1.5 km distancia aérea al E de Estación Biológica "Las Joyas") y "Cerro Las Chililllas" (ca. 2 km distancia aérea al NE del Cerro El Almeal). Sierra Manantlán Occidental, *E. J. Judziewics, T. S. Cochran 4958, J. Cruz L.* (IBUG. MEXU 16 July 1997, 3.5 km al SW de la desviación Los Amoles-Tuxpan de Bolaños, *Flores-Franco, G., J. Calónico F. 4859* (MEXU); 13 November 1952, Between Santa Monica and (north to) Aserradero Agua Blanco (probable), *R. McVaugh*

14145 (MEXU); 1 November 1985, Autlán de Navarro, Las Joyas (El Zarzamoro), Manantlán, *A. Loza 93* (MEXU); 19 October 1983, *L. Rico 650 et al.* (ENCB); 8 December 1981, 32 km al W del Talpa, camino a El Cuale, Mpio. Talpa, *A. S. Magallanes 3470* (IEB). **MICHOACÁN**; 15 June 1986, Puerto de Los Tepetates, aprox. 1 km al SE de Huajambero, Mpio. Cd. Hidalgo, *S. Zamudio R. 3915* (CIIDIR, ENCB); 12 June 1938, Michoacán de Ocampo, Pto. Zarzamora, *Hinton et al 12727* (NY, TEX-LL); 12 December 1991, Michoacán de Ocampo, *E. Estrada 2348, F. Kiss* (NY **NAYARIT**: 9 September 1984, 105 km WNW of Huejuquilla El Alto along road to Jesus Maria near side road to Santa Lucia de la Sierra, *D. E. Breedlove 61481* (CAS, NY); 24 August 1935, Cerro de San Juan, Southwest of Tepic, *F.W. Pennell 19981* (NY); 7 October 1965, N. slope of Cerro San Juan near Tepic, *H. D. Ripley 14038, R.C. Barneby* (NY); 14 November 1959, Nayarit, ca. 5.5 miles southwest of Jalisco, road to El Malinal, *R. McVaugh, W. N. Koelz 674* (CAS, MEXU); 21 October 1989, Mpio. Nayarit, 6.5–11.5 km al NE de la Mesa de Nayar, camino a La Ciénega, *G. Flores F. 1721* (IEB). **SINALOA**: 18 October 1983, Sinaloa , Near Loberas Microwave Station, *D. E. Breedlove 58871, F. Alameda* (CAS, MEXU, NY, TEX-LL); 6 September 1965, El Palmito on the Durango highway, *H. D. Ripley 14023, R.C. Barneby* (CAS, MEXU, NY, US); 4 August 1980, along small logging road near Loberas Microwave Station, *D. E. Breedlove 45013, F. Alameda* (CAS); 1 October 1971, About ¼ mi. W of El Palmito along old logging road behind the Rancho Liebre Fire Station, *R. W. Spellenberg 2723, D. Jackson, D. Martin* (NY); 30 September 1971, 5.5 mi. W of El Palmito about 50 m. on downhill side of Highway 40, where a dirt road extends out on a short ridge, *R. W. Spellenberg 2720, D. Jackson, D. Martin* (ENCB, NY); 22 August 1986, Badiraguato, 5 km al SE de Surutato, *P. Tenorio L. 11899, D. Frame* (MEXU); 2 July 1982, Puente de los Mimbres 43 km, al NW de Durango. Carr. Durango-Mazatlán, *P. Tenorio L. 783* (MEXU).

23.2. ***Astragalus ervoides*** Hook & Arn. var. ***maysillesii*** Barneby, Mem. New York Bot. Gard. 13: 448–450. 1964

Type:—MEXICO, Durango, El Salto, S along lumber road towards Pueblo Nuevo (about 60 km air mi, SW of C. Durango), 29 August 1952, *J. H. Maysiles 7824* (holotype: MICH1107106 digital image!).

Keel tip frequently purple tinted (*Spellenberg 13480,* NMC).

Distribution:—Southwest Chihuahua (Bocoyna, Valle de los Monjes), southern Durango (El Salto, Las Rusias, Neveros, Huizar, El Guayabo, Hacienda Coyotes and Los Banks), and isolated in southwestern Jalisco (Sierra de Manantlán) (Fig. 7).

Habitat:—Igneous and sandy soils; grassland in high plains; riparian areas with *Cyperus* spp.; grasslands and forest; oak-conifer forests; pine forest; cold conifers associations of pine-oak-manzanita-silktassel; disturbed grasslands; pine-oak-madrone-juniper forests; disturbed conifer forest; 2390–2800 m.

Specimens examined:—**CHIHUAHUA.** 27 August 2004, Valle de los Monjes, ca. 5 km al SE de Creel, Mpio. Bocoyna, *R. W. Spellenberg 13480* (CFNL). **DURANGO**. 9 September 1992, Reserva de la Biósfera la Michilia, Encina Gorda, Cerro Blanco, Mpio. Súchil, *A. García 1643, J. R. Medina* (CFNL); 22 July 1996, Parque El Tecuán, al E de la entrada al parque, Mpio. Durango, *A. García 2235, A. Acevedo* (CFNL); 9 August 1990, Municipio Pueblo Nuevo, Las Bayas de la UJED, bajo Los Alisos, *A. García 657* (CFNL, CIIDIR); 1 October 1971, About 25 mi. W. of City Durango on highway 40, *R. W. Spellenberg 2724* (ENCB, NY); 25 July 1981, 17 km al S de El Salto, cerca del paraje La Remuda, *S. González 1763, M. González* (CIIDIR, NY); 26 September 1973, Along Mexico Highway 40, about 85.5 miles west of Durango and 116.5 miles east of Mazatlan, 12.2 miles west of Las Adjuntas and 6.3 miles east of La Ciudad, 23.7 miles west of El Salto, Sierra Madre Occidental, *J. L. Reveal 3499, M. D. Atwood* (MEXU, NY); 5 October 1965, Sierra Madre 38 miles west of Durango on El Salto highway, *H. D. Ripley 13965, R. C. Barneby* (CAS, NY, US); 8 August 1971, Along Mexico highway 40 at La Campana, 0.5 miles north of the highway, this road junction being 2.5 miles west of Las Adjuntas and 13.6 miles west of El Salto, near a sawmill and the small village of La Campana, Sierra Madre Occidental, *J. L. Reveal 2692, W. J. Hess, R. W. Kiger* (NY, US); 21 July 1969, On eastern slopes of Sierra Madre Occidental, 20 km NE of El Salto on Mex. 40 to Durango, *B. Marks 1243, C. Marks* (NY); 5 October 1965, *H. D. Ripley 13998,* Sierra Madre near Hacienda Coyotes, ± 5 miles east of El Salto, *R.C. Barneby* (NY); 9 November 1963, Sierra Madre, 26 mi. west of Durango, *H. D. Ripley 13490, R. C. Barneby* (NY); 18 October 1965, Sierra Madre 8.5 miles w. of El Salto, *H. D. Ripley 14172, R. C. Barneby* (NY); 16 September 1979, 55–60 km SE of Durango City on road to La Flor, *D. E. Breedlove 44136* (MEXU, NY); 17 September 1979, Durango , 65–75 km SW of Durango City on road to La Flor, *D. E. Breedlove 44195* (MEXU, NY); 29/30 August 1934, Metades, north of Cueva. Sierra Madre Occidental, *F. W. Rennell 18391* (NY, US); 26 July 1972, Along Rte 40, 4.8 mi W of Los Mimbres, *L. McGill, R. Brown, D. J. Pinkava 9467* (NY); 17 August 1970, 1 miles SW of Durango, *C. D. Johnson*

115-70 (MEXU, NY); 19 August 1970, 8 miles SW of El Salto, *C. D. Johnson 131-70* (NY); 21 July 1975, About 24 miles west of Durango, along highway 40, *Torke 202, Dunn, Wallace* (ENCB, NY, TEX-LL); 25 December 1984, Caminos entre El Puerto del Picacho de San Campus (un paso 1.5 km distancia aérea al E de Estación Biológica "Las Joyas") y "Cerro Las Chililllas" (ca. 2 km distancia aérea al NE del Cerro El Almeal). Sierra Manantlán Occidental, *E. J. Judziewics, T. S. Cochrane 4958* (NY); 24 July 1958, *D. S. Correll 20123,* On upper slopes of Mimbres Canyon, 26 miles west of Durango, route #40 *M. C. Johnston* (NY, TEX-LL); 25 August 1965, high grassland, boulder strewn, rocky area by Hacienda Coyotes, off Mex. 4, *R. Kral 25747* (ENCB, US); 15 September 1985, El Indio, 78 km, de La Carr. Durango-Mazatlán, *P. Tenorio 9736, J. Ignacio S, C. Romero de T.* (IEB, MEXU, US); 10 September 1983, Pueblo Nuevo, *P. Tenorio 4330, R. Torres C.* (IEB, MEXU, US); 16 July 1955, Coyotes Hacienda, 63 road miles west —southwest of C. Durango, *J. H. Maysilles 7876* (MEXU*ez* (MEXU). **JALISCO:** 25 December 1984, Caminos entre El Puerto del Picacho de San Campus (un paso 1.5 km distancia aérea al E de Estación Biológica "Las Joyas") y "Cerro Las Chililllas" (ca. 2 km distancia aérea al NE del Cerro El Almeal). Sierra Manantlán Occidental, *E. J. Judziewics 4958* (NY); 27 September 1996, Los Amoles, 10 km al SO de Las Banderitas, Tuxpan de Bolaños, *J. Calónico S. 3000* (MEXU).

24. ***Astragalus esperanzae*** M. E. Jones, Rev. N.-Amer. *Astragalus* 277. 1923

Type:—MEXICO, Puebla, Esperanza, August 1908, *C. A. Purpus 3207* (holotype: RSA0002942 digital image!; paratype: RSA0002999941 digital image!).

Hamosa esperanzea (M. E. Jones) Rydb., Bull. Torrey Bot. Club 54(4): 335. 1927.

Astragalus chapalanus M. E. Jones, Rev. N.-Amer. *Astragalus* 277. 1923.—*Astragalus chapalensis* M. E. Jones ex Rydb., Bull. Torrey Bot. Club 54(4): 335, in syn. 1927.

Hamosa asperula Rydb., Bull. Torrey Bot. Club 54(4): 335–336. 1927.

Perennial. Stems up to 30 cm long, prostrate, branched from base, with few o many branches, minute strigose, trichomes up to 0.5 mm long, straight, appressed to ascendant. **Stipules** 2–6.3 mm long, connate (the lowest ones) and clasping (the upper ones), the lowest ones with a complete sheath around stem, the upper ones, attached basally only or attached to the middle of it, forming a sheath, acute apically, both straight. **Leaves** 2–12 cm long; leaflets 9–25, 3–18 mm long, linear, linear-oblong, oblong to oblanceolate, apically truncate or retuse, glabrate or minute strigose abaxially. **Peduncles** 1.5–14 cm long, curved and ascendant; the racemes 1–3 cm long, flowers 10–25, ascendant when young, turning deflexed with age. **Flowers** purple, cream or white but the banner with purple tones; the calyx 4.3–6.2 × 2.2–3.3 mm, minute strigose, trichomes black, sometimes mixed with white ones, the tube campanulate, 2.4–3.5 mm long, the teeth 1.5–3.2 mm long, subulate; the banner 7.2–9.2 × 2–2.4 mm, recurved, ovate to obovate, retuse; the wings 7.5–9.6 × 2–2.4 mm, the claw 2.5–3.6 mm long, the blade 5.7–7.3 mm long, oblong to oblanceolate; the keel 5.6–7.7 × 2.1–2.7 mm, the claw 2.6–3.5 mm, the blade 3.3–4.8 mm long, obovate. **Pod** 1.1–1.8 × 0.3–0.4 cm, sessile, lanceolate to ovate, triquetrous, compressed, ventrally carinate to short-winged, laterally rounded, dorsally deeply and with narrow grooves, basally rounded, distally ending in a short, subulate, curved beak, the valves light green to brown, glabrate to slightly strigose, trichomes white and black, papery, stiff, turning ochre or black with age, persistent attached for a time; septum complete, the pod thence bilocular; ovules 14–19; seeds 1.7–2.1 mm long, mitten shape, brown, sometimes with purple tones.

Distribution:—Endemic to Mexico. From Durango (Parque Tecuán), through Zacatecas, San Luis Potosí, central Jalisco, central Michoacán, south-central Hidalgo to central and western Puebla (Fig. 7).

Habitat:—Acidic, reddish, clayey soils; dry slopes; meadows; disturbed areas; associations of acacia,maguey, oak, navajita grassland; grasslands-mesquite; arid scrublands; pine forest; 2000–2927 m.

Comments:—Two particular features of this species are characteristic, the connate stipules and the persistent fruit, a combination not found in any other species in Mexico.

Specimens examined:—DURANGO: 4 June 1997, Parque El Tecuán, *S. González 5869, M. Pinedo* (CIIDIR); 10 July 1982, 32 kms. al W de El Salto, *R. Hernández M. 7820, Y. V. de Hernández, R. Hernández V., U. Hernández* (MEXU); **HIDALGO:** 16 July 1898, Hidalgo, Hills above Pachuca, *C. G. Pringle 7644* (CAS, US); 22-VII1903, Near Tulancingo, State of Hidalgo, *J. N. Rose 8828, J. H. Painter, J. S. Rose* (US); 29 August 1965, *Rzedowski 20598* (ENCB). **JALISCO:** 29 August 1958, Southeastern slopes of Cerro Gordo, above San Ignacio, ca. 12 miles southeast of Tepatitlán, *R. McVaugh 17527* (MEXU). **MICHOACÁN:** 5 August 1898, Hidalgo, Sierra de Pachuca, *C. G. Pringle 6955* (CAS, CIIDIR, ENCB, SD, TEX-LL). **PUEBLA**: VIII-1908, Esperanza, Puebla, *C. A. Purpus 3207* (JEPS).

SAN LUÍS POTOSÍ. 14 July 1963, 26 miles east of San Luis Potosi. Along highway 86 to Rio Verde, *R. L. McGregor 698, L. J. Harms, A. J. Robinson, R. del Rosario, R. Segal* (NY); 13–23-VII-1904, San Luis Potosí, Alvarez, *E. Palmer 203* (NY, US); 10 July 1965, 6 km SW of Rio Frio on old highway 190 at km 56, *K. Roe, 137, E. Roe, S. Mori* (NY); 13 September 1961, Zaragoza, Puerto de la Huerta, *A. Gómez 330* (ENCB, NY); 11 April 1963, Rancho El Milagro km 37 Carretera SL.P. Rio Verde, *A. Gómez 846* (NY); 1 August 1934, Potosi and Rio Verde, Sierra de Alvarez. Km 37 (western slope), *F. W. Pennell 17764* (NY, US); 30 July 1934, San Luis Potosi-Mexico, rocky limestone, km. 42 (eastern slope), *F. W. Pennell 17792* (US ¿-¿-1966, Potrero del Tanque, Cerrito de Dolores, Mpio. Villa de Arriaga, *A. Gómez G. 971* (ENCB); 23 July 1959, Sierra de Álvarez, cerca del Puerto de la Huerta, Mpio. De Zaragoza, *Rzedowski 11277* (ENCB); 13 September 1961, Paso de la Huerta, carretera San Luis Potosí-Río Verde, *A. Gómez 379* (ENCB). **ZACATECAS:** 1897, [Plateado], *J. N. Rose 2757* (NY.

25. ***Astragalus fastidius*** (Kellogg) M. E. Jones, Contr. W. Bot. 8: 7. 1898

Type:—MEXICO, Baja California, based on *Phaca fastidia*, according to Barneby (1964), there is no type specimen preserved, the holotypus is probably the Kellogg drawing.

Phaca fastidia Kellogg Hesperian 4: 145. 1860.—*Astragalus fastidiosus* Greene, Bull. Calif. Acad. Sci. 1: 186. 1885.

Astragalus leucopsis (Torr. & A. Gray) Torr. var. *fastidius* (Kellogg) M. E. Jones, Contrib. W. Bot. 10: 62. 1902.

Perennial. Stems up to 50 cm long, tussock, sprawling, erect, canescent or green-strigose; the trichomes up to 0.6 mm long, appressed to sub-appressed mixed with straight, sickle shaped and longer ones. **Stipules** 2–9 mm long, semi-clasping, somewhat decurrent, not connate, triangular. **Leaves** 2–15 cm long, leaflets 17–35, 3–20 mm long, oblong, elliptic to obovate, distally entire to retuse, concolour or bicolored, glabrate o slightly pubescent adaxially. **Peduncles**s 3–17.5 cm long, straight to curved, ascending; the racemes 1.5–9 cm long, lax, flowers 7–18, ascending when young, pendulous with age. **Flowers** purple, lavender, magenta-purple, violet the tip of wings and the center of the banner paler; pink-purple, greenish-yellow, yellow, green-white, light-green[1], cream-white or cream but turning yellowish when drying, sometimes the banner with white stripes down median line; calyx 5.5–8.2 × 2.4–4 mm, with black and white mixed trichomes, the tube 4.2–5.2 mm long, the teeth 1.5–3.8 mm long, lanceolate to subulate; the banner 13–16 × 6–8.3 mm, oblanceolate to narrow rhombic, retuse; the wings 12.3–16.2 × 1.8–2.3 mm, the claw 5.1–6.4 mm, the blade 8–8.9 mm long, linear to elliptic, oblique, retuse distally; the keel 10–11.2 × 2.3–2.8 mm, the claw 5–6.5 mm long, the blade 4.8–5.7 mm long, oblique, incurved, triangular-obovate. **Pod** elevated from the receptacle (in a strigose articulated, the joint easily seen at base of the pod, 3–9 mm long, straight to curved gynophore), 2–4.3 x 0.9–1.5 cm, spreading or pendulous, inflated, bladder-shape, somewhat cylindrical to semi-ovoid, externally sulcate, the sutures linear, ventrally straight or concave or less convex than the dorsal one, oblique-fusiform to lunate, basally rounded, apically ending in a flat straight or curved 4–8 mm long beak, the valves thin, papery, diaphanous or nearly so, minute strigose, pale ochre, bronze, red-violet, cream to purple, somewhat lustrous, reticulated, septum absent; ovules 20–27; seeds 1.7–2.7 mm long, brown, smooth.

Distribution:—Endemic to the Peninsula of Baja California; restricted to coastal dunes, and adjacent areas along the west coast of Baja California, between 32°18'–27°50'N, from San Quintín to the south, through El Socorro, El Rosario, Punta Baja, Punta Blanca, Punta Cono, Santa Rosalillita, Laguna Manuela, and in the extreme north of Baja California Sur, near Guerrero Negro, also on Cedros Island (Fig. 7).

Habitat:—Summit of ridge; flat immediately above beach; compacted sand; granite boulders, near salt marshes; silty flats; dry and sandy washes; shallow sandy arroyos, along aroyos; rocky slopes; coastal dunes; Vizcaino desert; rocky flats behind beachrdige; juniper scrubland; coastal blufs with prickle pear and maguey; coastal hills; creeks with salt bush; moist arroyo floor; disturbed soils; 30–400 m.

Comments:—The pods from *A. trichopodus* var. *lonchus* and *A. fastidius* are somewhat similar in shape, however they are easy to distinguish from each other since *A. trichopodus* has a true stipe that is continous with the pod. *Astragalus fastidius* is quite similar to *A. oxyphysus*, however, *A. oxyphysus* has racemes with a greater number of flowers (20–67), and white or cream emmaculate flowers, the calyx longer than 8.7 mm, the keel longer than 13 mm, and a lower number of ovules (10–18). Another species similar in appearance to *A. fastidius* is *A. oxyphysopsis*, since both have stipitate pods, however they can be differentiated because the pod of *A. oxyphysopsis* has a true stipe and the boy is glabrous, inflated, resembling a bladder, but strongly compressed laterally two-sided with its faces inflated only in the area where seeds are located. Although allopatric, morphologically *A. fastidius* is somewhat similar, at least in the form of growth, pubescence and foliage color to *A. sanctorum* (restricted in distribution to Ensenada and adjacent

areas), both species have inflated bladder-like pods, however, the pods of *A. sanctorum* are sessile or scantily raised from the receptacle by a tiny protuberance, less than 0.5 mm long.

Specimens examined:—**BAJA CALIFORNIA** 5 March 1994, Rosalillita along the road to San Jose Las Palomas; in sandy flats at junction with the road to Rancho San Andrés, *J. Rebman 2305* (BCMEX, MEXU); 10 October 1966, 20.3 miles (by road) south of San Quintin turnoff, coastal palin, *J. R. Hastings 66–97, R. M. Turner* (CAS, SD); 10 February1935, behind barrier beach 28 mi. SW of Punta Prieta , *A. L. Haines, Wm. Stewart s.n.* (CAS, NY); 27 June 1988, 12 km north of Guerrero Negro, along Route 1, 10 miles north of La Pinta Hotel , *T. S. Elias 10867, D. Arias, O. Dorado* (MEXU, NY); 2 January 1988, Desierto El Viscaino. 3 miles north of Guerrero Negro junction , *M. A. Franklin 5762* (NY); 7 March 1934, At the ocean—15 miles south of mouth of Escondido Canyon on Miller's Landing road, *R. S. Ferris 8599* (CAS, NY, SD); 30 March 1985, Santa Catarina Landing at the mouth of Arroyo Sta. Catarina, *A. C. Sanders 5581, E. Rodriguez, J. West et al* (CAS, NY); 27 February1986, 20–30 miles S of Punta Canoas along tract to Punta Cono, *D. E. Breedlove 62510* (NY, CAS, MEXU, TEX-LL); 28 February1985, Along road from El Rosario to Punta Baja , *D. E. Breedlove 62219* (CAS, MEXU, NY, TEX-LL); 27 February1985, 37 km S of San Quintin , *D. E. Breedlove 62191* (CAS, NY); 16 March 1984, 38 km S of San Quintin, *D. E. Breedlove 60731* (CAS, MEXU, NY); 24 May 2001, Santa Rosalillita, *R. Spellenberg 13229, N. Zucker* (MEXU, NY); 11 February1977, *V. L. Yadon s.n.* (NY); 13 March 1986, 7 mi. N of El Rosario, *D. W. Stevenson, 632, K. Endress, D. Rusell, R. Schmid* (NY, TEX-LL); 8 February1977, One at roadside 7 km SE of Miller's Landing , *R. Moran 23924* (MEXU, NY, SD); 16 April 1931, Bench above beach below Punta Prieta, 185 miles south of Rosario, *I. L. Wiggins 5385* (CAS, MEXU, NY, TEX-LL); 10 February1962, About 9 miles south of Puerto San Jose , *I. L. Wiggins, J. H. Thomas 199* (CAS, NY, US); 18 October 1966, along Pacific Coast. , *J. R. Hastings, R. M. Turner 66-156* (CAS, NY, SD); 27 February1986, 20–30 miles S of Punta Canoas along tract to Punta Cono , *D. E. Breedlove 62499* (CAS, ENCB, MEXU, NY); 26 February1986, near Punta Cono, *D. E. Breedlove 62478* (CAS, ENCB, MEXU, NY, TEX-LL); 10 February1935, Wash 18 mi. W. of Punta Prieta, *C. Epling, W. Robison s.n.* (NY); 15 October 1977, dry wash 10 miles northwest of El Rosario, *D. E. Breedlove 43026* (CAS, ENCB, MEXU); *25 March 1960,* Sandy area with many large dunes 15.5 mi. N. of La Espina*, D. M. Porter 550* (CAS, MEXU); 20 October 1959, Between La Espina and salt works at Laguna de Guerrero Negro , *J. H. Thomas 8246* (CAS, ENCB, MEXU); 1 January 1976, around El Socorro, south of San Quintin, in sand dunes and salt flats, *D. Johnson 69* (CAS); 27 September 1941, *B. J. Hammerly 79* (CAS, NY); 2 January 1934, north side of Colnett wash at ocean, *R. S. Ferris 8516* (CAS, MEXU); 23 February1963, Socorro, sand dunes, *R. Moran 10204* (CAS, ENCB, SD); 23 April 1946, Rosario, *R. Moran 2019* (CAS); 19 February1962, Valley floor, about 5 miles inland from Miller's Landing, *I. L. Wiggins 16750* (CAS, MEXU); 10 March 1930, Santa Catarina Landing, *I. L. Wiggins 4429* (CAS, MEXU); 23 February1938, Coastal terrace along beach 24 mi. S. of Punta Prieta, *I. L. Wiggins 7740A* (CAS); 11 May 1941, near Socorro, near seashore, *F. P. Cronemiller 3022* (CAS); 9 March 1993, Just north of Punta Canoas, broad wash back of beach, *D. E. Breedlove 72822, C. Burns* (CAS); 24 February1991, Near Punta Baja, Coastal bluff, *D. E. Breedlove 71589* (CAS); 6 June 1925, Revillagigedo Islands, Mexico, Cedros Island. Summit of ridge, *H. L. Mason 2033* (CAS; 18/20 March 1889, Cedros Island, *E. Palmer 683* (US); 5 June 1925, Cedros Island, *O. Solis 41* (US); 8 March 2002, Villa Jesus Maria, on Mex 1, north of Guerrero Negro, *A. L. Reina G. 2002-102, T. R. Van Devender, M. A. Dimmitt, J. F. Wiens, C. Martin* (USON); 14 March 2010, Ensenada, About 6.5 mi (air) south of Vale Tranquilo, about 25 mi south-southeast of San Quintin, west of Hwy 1, *M. Fishbein 6400, R. Levin, J. Miller* (MEXU, USON); 31 March 1970, At mouth of large arroyo 5.0 miles northwest of Punta Blanca, *R. Moran 17140* (SD); 29 March 1970, in bed of Arroyo Cataviña near the mouth., *R. Moran 17051* (SD); 19 April 1975, South side of Punta Baja near the tip, *R. Moran 21770* (CAS, NY, SD); 18 April 1960, Baja California, Silty flat south of Playa Maria Bay, *R. Moran 8196* (CAS, NY, SD, US); 25 March 1974, c. 25 mi S of Rosarito, *G. L. Webster 19649* (SD, MEXU); 27 March 1970, Occasional, Puerto Santa Catarina, *R. Moran 16996* (SD, ENCB); 18 April 1997, South of Santa Catarina: near coast S of Punta Canoas and Puerto Mujeres; near mouth of Rio Lazaro, *J. P. Rebman 4017, J. Merzbacher, T. Deméré* (SD); 8 December 2012, Half a kilometer north of M1 within arroyo, *J. Riley 6, J. Montiel* (SD); 23 March 2012, Valle Tranquilo vicinity, north of El Rosario and south of San Quintin, east of Hwy. 1 and just south of Arroyo Hondo; along canyon called Arroyo Ribes on Terra Peninusular property, *J. Rebman 22955, S. Vanderplank, J. Riley* (SD); 11 October 1987, Wash on the floor of a side canyon off the canyon of the Rio del Rosario, 0.8 mile above the beach at the river's mouth, *A. C. Sanders 7410* (CAS, SD); 16 January 2012, Pacific Coast: site of Costa Rica, between El Rosario and San Quintin, c. 2 km south of El Socorro and c. 1 km east of the coast, *T. B. Salvato 5518, J. Rebman, S. Vanderplank, J. Riley* (cas, SD); 16 April 2010, Lagunita El Rincón, *M. Salazar 5449, E. López, S. Alfaro* (CAS, SD); 6 February 2015, Santa Rosalillita. At the entrance to the town on soft sand dunes, *S. Vanderplank 5250, T. Burgess* (CAS, SD); 2 April 2015, Cedros Island. Saline flats on S side of Lower Vargas canyon (moist flats), *S. Vanderplank 5671, J. Rebman, S. Junak* (CAS, SD); 29 March 2016, Mesa Nueva York, 9 km inland from San Quintín,

J. Riley 438, S. Alfaro (CAS, SD); 2 March 2016, 2.5 km inland from carretera, Arroyo Hondo, *J. Riley 422, S. Alfaro* (CAS, SD); 14 February 2014, Desierto Vizcaino, carretera Transpeninsular 1, *J. L. León de la Cruz 12008* (SD2 May 1992, 20 mi S of San Quintin on dirt road E of Mexican Highway 1, *J.S. Miller, M. Merello, A. Pool 7375* (MEXU); 28 April 1987, Ensenada, 10 Km al NW de Rosario, carr. a Ensenada, *P. Tenorio L. 13144* (MEXU); 22 March 1960, Salty, rocky sand W of broad estero on road which crosses salt flats, 47.5 mi. S. of San Ignacio *D. M. Porter 521* (MEXU); 31 March 1988, R. F. N end of island N of fishermen's village at lower end of Canada de la Mina*, Throrne 63145* (MEXU); 29 March 1987, c. 5 NW of Punta Blanco, *G. L. Webster 26051* (MEXU); III June 1897, Cedros Island, Mex. On the Islands off the coast of and on the Adjacent Mainland, *A. W. Anthony 314* (MEXU); 11 April 1952, *H. S: Gentry 11692, W. B. Fox* (MEXU); 22 April 1962, 1.5–2.5 miles upstream from Rincon, 4–5 miles northeast of Santa Catarina, 64 miles southeast of Ensenada, *R. E Broder 712* (MEXU); 25 November 1981, *M. Mendoza L. s.n.* (ENCB); 4 January 1987, Ensenada, Isla Cedros; aprox. 1 km al SE de la bomba, *H. Cota, 7429, A. Salgado* (ENCB, MEXU); 20 March 1984, 10 km E of Santa Rosalillita, *D. E. Breedlove 60815* (CAS, NY); 2 March 1964, Calipatria, Isla de Cedros, B.C., *X. Madrigal S. n.n* (MEXU); 20 February1986, Isla Cedros: Canada de la Mina, below old copper mine, *R. F. Thone 61561* (MEXU); 1 June 1073, About 10 mi. NW of Santa Rosalia, *R. S. Spellenberg 3326 et al*. (ENCB, NY); 19 January 1975, Cedros Island, on NE end of Island, in canyon about 1 mile S of lighthouseand village at Cabo Norte, *Henrickson 14440* (ENCB); Cedros Island, *R. Moran 10682* (NY, SD27 May 1971*,* Cedros Island; 2.0 miles from north end, *R. Moran 18427* (SD, ENCB); 13 April 1983, Canon de la Mina; Cedros Island, *T. Oberbauer, H. Wier, E. Wier, s.n.* (SD); 23 February1977, Cedros Island; 2.0 miles south of the lighthouse on the east side, *C. Davidson 5517* (ENCB, SD); 8 March 1939, Cedros Island; arroyo of Grand Canyon 3.5 miles from east coast, *A. L. Haines, G. Hale, s.n.* (SD); 30 March 1978, Cedros Island; Cañon Grande, *R. Moran 25423* (SD); 6 June 1925, Revillagigedo Islands, Mexico, Cedros Island. Summit of ridge, *H. L. Mason 2033* (NY). **BAJA CALIFORNIA SUR**. 18 December 1989, Viscaino Desert, ca 9 km north of Guerrero Negro at Mexico Hwy 1 km post 121, just inland from Laguna Guerrero Negro, sand dune beside highway, *F. M. Roberts 4539, D. A. Roberts* (SD); 24 December 1973, Old Cabin, approx. 30 miles NW of Guerrero Negro, *Y. Petryszyn 13a* (ENCB).

26. ***Astragalus filipes*** A. Gray, Proc. Amer. Acad. 6: 226. 1864

Type:—USA, (holotype: North branch of the Columbia River, non date, *C. Pickering s.n.* holotype NY 00005418! (first sheet); Dry prairies between Fort Okanagan, *C. Pickering s.n.* NY 00005419! (second sheet); isotype: Int. Oregon, 1838, *Wilkes Expedition s.n.* GH 00058737 digital image!).

Homalobus filipes (Torr.) A. Heller, Muhlenbergia 9: 67. 1913.

Astragalus stenophyllus Torr & A. Gray var. *filipes* (Torr. ex A. Gray) Tidestr., Proc. Bio. Soc. Washington. 50: 20. 1937.—*Tragacantha filipes* (Torr. ex A. Gray) Kuntze, Revis. Gen. Pl. 2: 944. 1891.

Perennial. Stems striated, up to 0.9 m long, single or branched near base, erect, rarely decumbent or crawlers, green or with purple tones at the base, the base commonly without leaves, only stipules present, soft strigose to subglabrate, the trichomes up to 0.6 mm long, straight and appressed. **Stipules** 2–5.8 mm long, the lowest ones clasping to connate, were forming a complete sheath bidentate around stem, with brown to purple tones, the middle and upper ones clasping and shorter, not connate. **Leaves** 2–12 cm long, leaflets 5–23, 4.5–23 mm long, separated to each other, linear, oblong, oblong-elliptic to elliptic, obtuse to truncate, rarely acute, glabrate to pubescent in both faces, when pubescent, denser adaxially or only pubscent in one surface. **Peduncles** 4–22 cm long, generally straight, rarely scarce curved; the racemes 3–23 cm long, lax, flowers 4–30, pendulous. **Flowers** concolorous, white, cream to light-green; the clayx 4–7.7 × 2.3–4.5 mm, minute strigose, the trichome black and white mixed, the tube 3.2–5.5 mm long, the teeth 0.5–1.6 mm long, triangular, ventral pair wider than longer; the banner 10–15.3 × 4.5–10 mm long, recurved, ovate, elliptic, rhombic to spathulate; the wings 9–15.3 x 1.7–2.5 mm, the claw 3.5–6 mm, the blade 6–9.4 mm long; the keel 6.3–12 × 2.3–3.4 mm, lunate, the claw 3.3–6.5 mm long, the blade 3.6–5.8 mm, apically acute. **Pod** pendulous, stipitate (the stipe 6–16 mm long, straight or curved downward, minute strigose), 1.7–3 × 0.3–0.7 cm, linear, oblong to elliptic, straight or almost so, narrowed at both ends or gradually narrowing basally, distally apiculate, the sutures filiform, laterally strongly compressed, carinate, green, ochre, to light brown, glabrate or strigose, papery, reticulate, septum absent, the pod thence unilocular; ovules 11–22; seeds 2.6–3 mm long, mitten shape, brown to reddish.

Distribution:—In Mexico, recorded in northern Baja California, in the Sierra Juárez (Arroyo Piedras Finas, Los Gavilanes, La Rumorosa and El Topo), Rancho Coyotes. Also, in California, Oregon, Washington, and Idaho in the USA (Fig. 7).

Habitat:—Gravel, sandy soils; open ridge rolling tops; slopes, embankments and dry rocky fround; streams; associated to chaparral; manzanita scrublands; oak forest and oak-pine forests, 1600–1810 m

Comments:—At least twelve different species of *Astragalus* can be found in both of these sierras of Baja California, however, *A. filipes* is the only one with whitish or creamy (concolorous) flowers, and straight, flattened, linear to elliptic (never inflated nor triquetrous) pod, and a true pubescent stipe, 6–16 mm long, elevating the pod above receptacle.

Specimens examined:—**BAJA CALIFORNIA**: 22 June 1980, Sierra Juarez. On east slope, Arroyo Piedras Finas, 1 km S of Los Gavilanes, *R. Moran 28914* (CAS, ENCB, MEXU, NY, SD, US); 31 May 1952, near El Topo, Baja California, *C. F. Harbison 44793* (NY, SD); 27 December 1993, 4 miles north of Rancho De Coyotes on Hwy 1, *D. Atwood 18885, K. Thorne, K. Anderson* (NY); 18 May 1986, Sierra Juárez. 44 km SE of La Rumorosa on road to Laguna Hanson, *G. A. Levin 1692, C. Brey, R. P. Levin* (MEXU, NY, SD); 31 July 1883, Hanson's Ranch, *C. R. Orcutt* (NY); 22 April 1885, Hansen's ranch, *C. R. Orcutt s.n.* (NY); 22 June 1980, Sierra Juarez. On east slope, Arroyo Piedras Finas, 1 km S of Los Gavilanes, *R. Moran 28914* (MEXU, SD).

27. *Astragalus francisquitensis* M. E. Jones, Proc. Calif. Acad. Ser. 2, 5: 666. 1895

Type:—MEXICO, Baja California Sur, San Francisquito, 18 October 1891, *T. S. Brandegee s.n.* (holotype: CAS 0000958 digital image!; isotype: Sierra de San Francisquito, *T. S. Brandegee 139* UC84759 digital image!).

Astragalus lagunensis M. E. Jones, Contrib. W. Bot. 8: 11. 1898.

Hamosa francisquitensis Rydb., N. Amer. Fl. 24(7): 429. 1929.

Annual or biennal. Stems up to 60 cm long, slightly ascendant to prostrate, scattered strigose, the trichomes up to 0.5 mm long, appressed, straight. **Stipules** 1–5 mm long, semi-clasping, not connate, papery, ovate to lanceolate, green or frequently purple. **Leaves** 1–8.5 cm long, leaflets 7–21, 2–11 mm long, oblong, elliptic to spathulate, entire or slightly retuse apically, thin and delicate, bicolored, green-yellowish and glabrate adaxially. **Peduncles** 2–12 cm long, ascendant; the racemes 1–4 cm long, flowers 2–10. **Flowers** lavender, purple, light purple, pinkish-purple, sometimes the banner red-violet; the calyx 4.4–5.7 × 2.6–3.2 mm, minute strigose, the trichomes white only, the tube 2.6–3.2 mm long, the teeth 1.4–2.6 mm long, subulate to lanceolate, rarely little wider; the banner 8.1–10.3 × 3.3–6.2 mm, recurved, ovate to oblanceolate, retuse distally; wings 8–9.3 × 1.2–2.1 mm, the claw 2.8–3.4 mm long, the blade 5.2–6.2 mm long, oblong to oblanceolate, obtuse or retuse apically; the keel 5.3–6.4 × 1.6–2.2 mm, the claw 3–3.4 mm long, the blade 2.8–3.7 mm long, semi-obovate. **Pod** 1–1.5 × 0.2–0.35 cm, sessile, ascending or erect, obtuse basally, narrowing gradually apically, ending in a short beak, linear-oblong, triquetrous, straight or almost so, laterally compressed and almost flat, dorsally deeply sulcated, ventrally carinate; the valves green, papery, ochre, scattered and minute strigose, reticulate, septum complete, the pod thence bilocular; ovules 6–12; seeds 1.3–1.6 mm long, mitten shaped, brown.

Distribution:—Endemic to Baja California Sur. *Astragalus francisquitensis* has the most southern distribution of any other species in this genus on the peninsula of Baja California, and it is the the only member of the genus occurring in the Sierra La Laguna (Fig. 8).

Habitat:—Granitic and sandy soils, also in compact shallow soils; open slopes; dry rocky ground; granitic gravels; dry banks just above streams; associated with open grasslands surrounded by pine-oak forest; forest with oak, pine, madrone; areas with oak and palms as dominant; grassy forest openings; 200–2200 m.

Specimens examined:—BAJA CALIFORNIA SUR: 1 February2005, *M. Domínguez León 3851* (BCMEX); 8 December 1947, Along trail to Laguna, Sierra de la Laguna, east of Todos Santos, *A. Carter 2441, A. M. Alexander, L. Kellogg* (NY, MEXU, US); 2 March 1928, Laguna Mountains, *M. E. Jones 24175* (CAS, NY, SD, TEX-LL); 9–11 May 1959, The Cape region. Potrero de Almenta, Arroyo de Almenta, eastern slopes of the Sierra de la Victoria. Inland from Caduano, *J. H. Thomas 7843* (CAS, NY); 16/18 May 1959, Cape Region. La Laguna, *J. H. Thomas 7913* (CAS, MEXU, NY, SD); 9/11 May 1959, The Cape Region. Potrero de Almenta. Arroya de Almenta, eastern slopes of the Sierra de la Victoria. Inland from Caduano, *J. H. Thomas7844a* (MEXU); 30 April 1959, Near canon mouth, El Chorro, *R. Moran 7291* (CAS, NY); I March 1939, Cerro de la Giganta, *H. S. Gentry 4287* (CAS, MEXU, NY, US); 23 March 1939, *H. S. Gentry* La Laguna, Sierra Laguna, *4376* (CAS, MEXU, NY); 12 April 1955, La Chuparosa. From San Jorge to San Francisquito and La Chuparosa, east side of Sierra de la Victoria, *A. Carter 3358* (CAS, SD); 26 March 1892, Sierra de la Laguna, *T. S. Brandegee, s.n.* (US); 21 March 1991, La Paz—Cerro La Torre, Sierra de La Laguna, *M. Domínguez L. 241*(MEXU).

28. ***Astragalus gambelianus*** E. Sheld., Bull. Geol. Nat. Hist. Surv. 9: 21. 1894

Type:—USA, California, Catalina Island, *T. Nuttall s.n.*(holotype (base on *Astragalus nigrescnes*): PH00005487 digital image!; isotype (as *Holalobus nigrescens*): H00058844 digital image!).

Hesperastragalus gambellianus A. Heller, Muhlenbergia 2: 87. 1905.

Annual or **perennial. Stems** 5–30 cm long, erect, single or branched basally, the external ones incurved-ascending distally, pubescence pilose, the trichomes up to 0.7 mm long, ascending, incurved. **Stipules** 1–3 mm long, deltoid to lanceolate, clasping semi or completely so, not connate. **Leaves** 1–4 cm long, leaflets 7–15, 2–9 mm long, linear, oblanceolate, strongly retuse, rarely truncate, their margin sometimes purple, adaxially and abaxially pubescent. **Peduncles** 2–6 cm long, ascending; the racemes 0.3–2.7 cm long, flowers 4–15, very dense, constituing a compact capitulum when young, ascending when young, pendulous with age. **Flowers** whitish, violet or lilac, the veins or margins with blue tones; the calyx 1.7–2.5 × 1–1.5 mm, pilose, mostly with black trichomes, rarely white ones, the tube 1.1–1.7 mm long, campanulate, turbinate or ovoid-campanulate, the teeth 0.5–0.9 mm long, subulate to triangular; the banner commonly 2.5–3.3 × 1.5–2 mm, ovate, elliptic, spathulate, sometimes shallowly retuse; the wings 2.2–2.7 × 0.5–0.8 mm, the claw 0.8–2.2 mm long, the blade 1.5–1.9 mm long, widely oblongs; the keel 2.2–2.5 × 0.8–1.1 mm, claw 0.9–1.2 mm long, the blade, sub-quadrangulate or almost orbicular; **Pod** 2.8–4.2 × 2.4–3.6 mm, deflexed, sessile, widely ovate, rhombic to dosrsally semicircular, rounded to widely cuneate, slightly retuse basally, distally narrowed abruptly in a minute, conic beak, dorsally obcompressed, wide and openly sulcate, the lateral angles narrow, reticulate, incurvate, ventrally straight or somewhat concave, the valves thin, hirsute to strigose, green, the trichomes up to 0.4 mm long, extended o incurved, rarely appressed, becoming papery, ochre or brown, the septum complete, the pod two-celled, or almost so; ovules 2; seeds 1.8–2.6 mm long, oblong, pale to dark brown, sometimes purple speckled, smooth.

Distribution:—In Mexico, in the northwestern and central portions of Baja California (El Jaraguay, 10 km SW of Santa Ynés). Also, in California and Oregon (USA) (Fig. 8).

Habitat:—Sandy or clayey soils, open grasslands, chaparral, oak-pine forests, rare, 750 m.

Comments:—From all the *Astragalus* species distributed on the peninsula of Baja California, only *A. didymocarpus* and *A. gambelianus* have small, never larger than 4.2 mm long, two-seeded fruits. Both species can be distinguished by the arrangement of their flowers and fruit shape. *Astragalus didym*ocarpus has flowers and pods erect, the pods are bladder-like or subglobose, divided into two inflated, separated sacks.

Specimens examined:—BAJA CALIFORNIA: 1882, Lower California, *C. C. Parry s.n.* (CAS); 25 February 1973, Colonet Mesa, 0.5 mile north of Colonet, *R. Moran 20288, J. L. Reveal* (SD); 19 April 1980, Valley floor, 7.0 km southwest of Ojos Negros, *R. Moran 28261½* (SD).

29. ***Astragalus gentryi*** Standl., Field. Mus. Bot. Ser. 22: 22. 1940

Type:—MEXICO, Sonora, Rio Mayo, February 1930, *H. S. Gentry #xo* (holotype: F0058939F digital image!; isotype: Sonora, San Bernardo, Rio Mayo, February 1934, *H. S. Gentry s.n.* ARIZ-BOT-0004068 digital image!, ARIZ.BOT-0004069 digital image!, San Bernardo, Rio Mayo, 23 Febraury 1935, *H. S. Gentry 1345* MICH1107107 digital image!).

Annual o**r perennial**. **Stems** up to 30 cm long, prostrate or creeping and with radial growth, minute strigose, the trichomes appressed to subappressed, up to 0.6 mm long, white. **Stipules** 2–5 mm long, semi-clasping, not connate, dorsally glabrate or almost so, margins ciliate. **Leaves** 1.5–8 cm long, leaflets 11–17, 2–10 mm long, ovate to elliptic, obtuse, truncate, retuse or mucronate, adaxially glabrate. **Peduncles** 4–10 cm long, straight or curved; the racemes 1–4.8 cm long, short, dense remaining so until flowers opens or lax with age, flowers 4–12, spreading to ascending. **Flowers** pink, reddish-lavender, fading purple, purple to violet; the calyx 4.8–6.3 × 1.6–2.6 mm, minute strigose, trichomes white and black mixed, sometimes all white, the tube 3.3–4.3 mm long, subcylindrical, campanulate to oblong, sometimes basally inequilaterous, the teeth 1.4–2.2 mm long, papery; the banner 7.6–11.2 × 4.5–6 mm, widely obovate, obtuse to retuse distally, recurved; the wings 6.6–9 × 1.5–2.2 mm, the claw 3.3–4.8 mm long, the blade, 4–4.7 mm long, narrow oblanceolate; the keel 7.1–9.3 x 1.6–2.4 mm, the claw 3.5–5 mm long, abruptly incurved, equal or longer than wings; **Pod** sessile, 10–15 × 2.5 mm, ascending, linear to lanceolate, basally rounded, gradually narrowing and ending in a triangular apex, triquetrous, laterally compressed or flattened or almost so, ventrally carinate, lateral angles obtuse, dorsally and narrowly sulcate, the valves papery, ochre to greenish, minute strigose, reticulate

perpendicularly, septum complete, the pod thence bilocular; ovules 12–18; seeds 1.4–1.5 mm long, brown, smooth, somewhat opaque.

Distribution:—Endemic to Mexico. Restricted to northwestern Mexico, mountains of the geopolitical border of Sonora (Yécora, Vallecitos, Cebadilla, Casa Blanca, Maicoba, El Álamo, Chinaguito, Calabazas) and Chihuahua (Batopilas, Nabogame, Maguarichi, Yepachi, Tubares, Guinoloza, El Fuerte and San Ignacio) and mountains in central-eastern Sinaloa (Bamepa, Bamopa, Maturipa and Amoles) in close proximity to extreme northwestern Durango (Fig. 8).

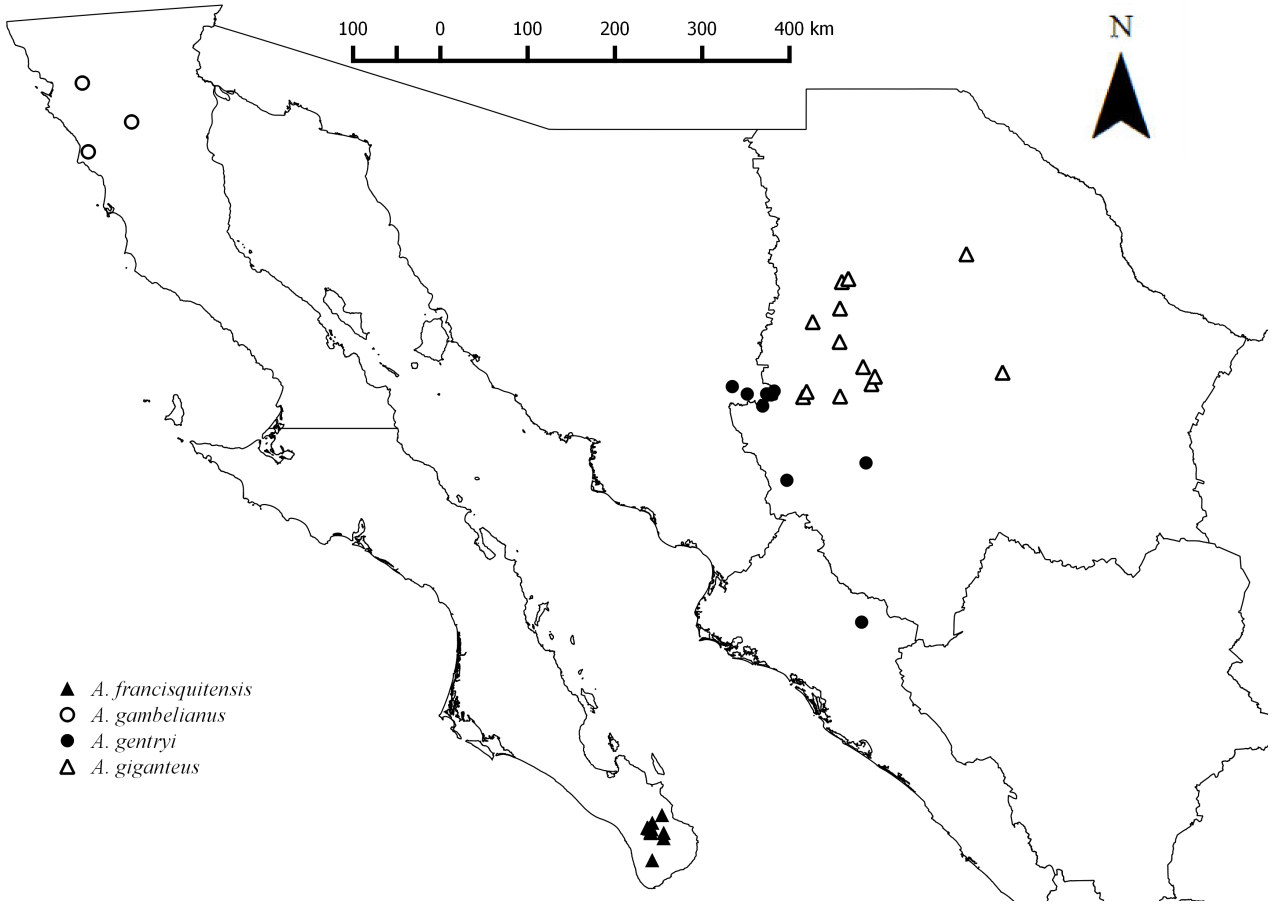

FIGURE 8. Map showing the distribution of *Astragalus francisquitensis, A. gambelianus, A. gentryi,* and *A. giganteus* in Mexico.

Habitat:—Volcanic slopes and rocky igneous slopes; clayey and yellow soils; moist soils with organic matter; roadside, streams and rivers; canyon bottom; damp and cool canyons, with cypress-oak-pine; oak-pine forest; riparian conifer forest with oak and grassland; oak-pine-madroño forest; riparian forest with cypress, juniper; grasslands in hillsides; along streams; 1500–1933 m.

Comments:—So far as we know, *A. gentryi* is the only species, at least in Mexico, in which the keel petal is equal or lightly longer than the wing petals.

Specimens examined:—CHIHUAHUA: 17–25 April 1948, Rancho Byerly, Sierra Charuco, *H. S. Gentry 8024* (CAS, MEXU, NY, US); 27 September 1983, Loc. 4 km, al W de Talayotes o 35 km, al E de Yecora, *P. Tenorio L 4535, C. Romero de T.* (NY); 1 May 1987, Nabogame, *J. E. Lafferriere 421* (NY); 27 April 1985, ca. 25 air miles SW of San Juanito, Maguarichi, igneous rock, canyon above village, *R. Spellenberg 8099, R. Soreng, R. Corral, J. Cornelius, C. Spurrier, T.K. Todsen* (MEXU). **SINALOA**: 17–24 March 1945, Los Pucheros, Sierra Surotato, *H. S. Gentry 7212* (NY); 8 March 1985, Badiraguato, +–11 km. de la brecha Surutato, Sta. Rita, *R.A. González, M. A. Armenta P., J. A. Méndez A. 173* (MEXU). **SONORA**: 8 April 1982, Sierra Madre Occidental, along the old dirt road from Santa Rosa to Yecora, 8 miles east of Santa Rosa, about 10 miles west of Yecora, about 33 miles (airline) NE of Movas, *A. C. Sanders 2646, K. Kirkland, D. Emery* (NY); 4 May 1995, Arroyo, 3–4 km north-northwest of El Kipor (Quipur), *T. R. Van Devender 93-380, A. L. Reina* (NY, TEX-LL, USON); 27 September 1983, 4. Km. al W de Talayote, camino a Yécora, o 35 Km. al E de Yécora, Limites de Sonora y Chihuahua, *R. Torres C. 3828, P. Tenorio L.* (ANSM, MEXU, NY); 11 October 1933, *H. S. Gentry 523* (CAS); 29 March 1997, Ciénega de Camilo, 6 km east of El Kipor, 10 km of west of Chihuahua brederon Mex. 16, *T. R. Van Devender 97-403, A. L. Reina G.* (, USON); 19 February1997, CA 7.5 KM e

OF Yecora on Mex 16 at Yecora, *T. R. Van Devender 97-145, A. L. Reina, M. Kaib* (USON); 22 March 1992, Yécora—1.5 km E of Yecora towards Maycoba along MEX 016, near km 281, on old river terraces around first barranca E of village, *Eggli, Nyffeler, Struppy, Thiede 2031* (MEXU); 12 March 1996, Yécora—8.9 km east of Yecora on Mex. 16, *T. R. Van Devender 96-91, A.L. Reina, S. L. Friedman, W. Trauba* (MEXU); 12 March 1996, Yécora, 8.9 km east of Yecora on Mex. 16, *A. L. Reina 96-43, T. R Van Devender, S. L. Friedman* (MEXU); 27 September 1983, 4 km, al W de El Talayote ó 35 km, al E de Yécora, limites de Sonora y Chihuahua, *P. Tenorio L. 4535, R. Torres C.* (MEXU); 27 June 2007, Moris—Bermudez, *T. R. Van Devender 2007-645, A.L. Reina, J. Veteto* (MEXU); 28 March 1997, *T. R. Van Devender 97-387,* Yécora—Maycoba, *A. L. Reina G.* (MEXU); 15 May 2008, Ca. 1 km south of Maycoba along Río Maycoba, *T. R. Van Devender 2008-196, A. L. Reina G. Z. Espinoza G.* (, MEXU, USON).

30. ***Astragalus giganteus*** S. Watson, Proc. Amer. Acad. 17: 370.1882

Type:—USA, Texas, Fort Davis, Westem Texas, 1881, *V. Havard 32* (holotype: GH00058746 digital image!; isotype: US00004099 digital image).

Astragalus texanus E. Sheld., Minnesota Bot. Stud. 1: 65. 1894.

Astragalus giganteus E. Sheld., Bull. Geol. Nat. Hist. Surv. 9: 65. 1894.

Astragalus yaquianus S. Watson, Proc. Amer. Acad. 23: 270. 1888.—*Astragalus giganteus* E. Sheld. var. *yaquianus* (S. Watson) M. E. Jones, Rev. N.—Amer. *Astragalus* 234. 1923.

Perennial. Stems erect, decumbent to semi-prostrate, single or several, branched from base, up to 60 cm long, the trichomes of two types, 1.3–2.5 mm long, short and curly, mixed with longer and straight, these last ones spirally-twisted also, becoming ochre-ash with age. **Stipules** 6–17 mm long, stiff, triangular to acuminate, semi-clasping, decurrent, not connate, densely sericeous-pilose dorsally. **Leaves** 9–35 cm long; leaflets 17–35 oblong, 1–7.8 cm long, ovate, elliptic to narrow rhombic or elliptic, acute at both ends, sometimes abruptly acuminate distally, the midvein protruded abaxially, pilose. **Peduncles** 10–32 cm long, hard, ascending, rarely slightly curved; the racemes 5–21 cm long, flowers 15–67, ascending but soon deflexed. **Flowers** yellowish, pale yellow, green-yellowish to yellow-greenish; the calyx 7.5–14.7 × 3–5.2 mm, silky-pilose, the trichomes white; the tube campanulate or subcylindrical, 6–8.5 mm long, the teeth lanceolate, 3–6.5 mm long, papery; the banner 1.4–2.5 × 0.6–1 cm, oblanceolate, rhombic to elliptic, shallowly retuse distally; the wings 1.2–1.9 × 0.2–0.3 cm, the claw 6.9–9.6 mm long, the blade 7.5–11.4 mm long, lanceolate to oblong, obtuse distally; the keel 1.1–1.6 × 0.2–0.4 cm, the claw 7–9 mm long, the blade 5.8–7.2 mm long. **Pod** 1.5–2.8 × 0.8–1.3 cm, sessile, inflated, ovoid to elliptic, slightly incurved, basally rounded, distally contracted in triangular short beak, laterally somewhat compressed, sometimes dorsoventrally compressed also, dorsally flattened o slightly sulcate, ventrally openly sulcate, the valves fleshy or strongly leathery with age, glabrate, green, turning brown, ochre o black with age, thinly perpendicularly reticulate, sometimes rugose longitudinally, septum complete, the pod thence bilocular or almost so below the beak; ovules 28–47; seeds 1.9–2.6 mm long, brown to black, smooth, opaque.

Distribution:—Restricted to the mountains of Chihuahua. The area where this species distributes harbors at least 13 species of *Astragalus*, but none of them have both, yellow or light yellow flowers and leaves as large as this species. Sometimes it is locally abundant. In Mexico, restricted to the mountains in central, western and central-western Chihuahua (Ocampo, Yepachi, Gómez Farías, La Junta, Temósachi, Guerrero, Oscar Soto Maynez, Bachíniva, Buenaventura and Zaragoza). Also in New Mexico and Texas (USA) (Fig. 8).

Habitat:—Basalt, dark, yellow, clayey, sandy soils; bare slopes, deep to shallow soils; grasslands; plains with flooded grassland, overgrazed grasslands, plains with accia, prickle pear and oak; pine-juniper-madrone forest; pine forests with secondary vegetation, roadside; conifer-broadleaved forest; 1815–2600 m.

Specimens examined:—CHIHUAHUA: 28 August 1990, Madera—Arroyo de las Garrochas, ejido El Largo, *O. Bravo B. 1303* (ANSM, CIIDIR, IEB, MEXU); 24 June 1990, Madera—Rancho La Quinta, ejido El Largo, *A. Benítez 1405* (ANSM, CIIDIR, IEB, MEXU); 17 July 1997, Ocampo. 15.2 km east of Yepachic on Mex. 16, *A. L. Reina 97-783, T. R. Van Devender, D. Larson, P. Merlin, M. J. Martinez C., Dunn, Torke* (CAS, MEXU, NY, TEX-LL); 19 July 1975, Collected on Hwy. 16; approximately 30 mi. W of the La Junta Jct., near mountain village, *Ellis 1077, Dunn, Torke* (ENCB, NY); 19 July 1975, Collected on Hwy. 16; approximately 30 mi. W of the La Junta Jct., near mountain village, *Ellis 1080, Dunn, Torke* (CAS, ENCB, MEXU, NY, TEX-LL); 27 August 1971, 3 mi. S of Guerrero; end of road along Rio Papigochic at dam, *L. McGill 8359, D. Keil* (NY); 9 September 1994, Chihuahua, Laguna de Babícora, *E. Estrada 3526, T. Lebgue, G. Quintana* (CAS, NY); 26 August 1994, Laguna de Babícora, 15 km al SO de San José de Babícora, *C. Yen, E. Estrada 3428* (CAS, NY); 16 August 1959, between Santo Tomas and Madero, 90 miles n.w.

of Chihuahua, *A. R. Kruckeberg 4925, 4926* (CAS, NY); 13 May 1929, San Ysidro, S.W. of Barranca, *Y. Mexia 2527* (CAS, MEXU, NY); 15 July 1997, 2 mi NE of Zaragoza on Mexico Hwy 10, *N. D. Atwood 22909, J. Spencer* (NY, TEX-LL); 21 October 1968, Chihuahua, near Sta. Ana Babicora on the road to Bachiniva, about 2 mi. W of the summit, *R. W. Spellenberg 2004, M. Spellenberg* (NY); 3 June 1908, Vicinity of Madera, *E. Palmer 295* (NY, US); 17 August 1971, Temosachic, *P. Tenorio 6541, C. Romero de T.* (CIIDIR, IEB, MEXU, NY, US); 15 August 1994, Laguna de Babícora, *E. Estrada 3229, T. Lebgue* (NY); 18 September 1934, Santo Tomas, on railroad northwest of San Isidro. Sierra Madre Occidental, *F. W. Pennell 18992* (US); 9 June 1971, Ignacio Zalazar, *Gentry 22956, Argüelles* (MEXU, US); 17 June 1997, Ocampo. 15.2 km east of Yepachic on Mex. 16, *A. L. Reina 97-783, T. R. Van Devender, D. Larson, M. J. Martínez* (MEXU); 14 August 1998, Mex. Hwy. 16 42 rd. km W of Basaseachi, 12.5 rd km E of Yepachi, at KM marker 307.5, *R. Spellenberg 12594, L. Brouillet, T. K. Todsen* (MEXU); 10 July 1958, San Pedro, in rocks along Río Papigochi, southwest of Miñaca, *I. W. Knobloch 830* (ENCB); 5 August 1975, Río San Miguel, Babícora, Mpio. Zaragoza, *J. M. Peña JMP-035* (ENCB).

31. ***Astragalus goldmanii*** M. E. Jones, Rev. N.-Amer. *Astragalus* 281. 1923

Type:—MEXICO, Chihuahua, Hidalgo del Parral, 19 September 1898, *Goldman 119* (holotype: US00004097 digital image!; isotype BM000931605 digital image!, GH00059412 digital image!).

Hamosa goldmanii (M. E. Jones) Rydb., Bull. Torrey Bot. Club 54: 332. 1927.

Perennial. Stems up to 60 cm long, thin, erect, suberect to decumbent, densely minute strigose and villous, the trichomes short, up to 1 mm long, appressed or both mixed, appressed and straight together. **Stipules** 1.5–6 mm long, semi-clasping, not connate, triangular to lanceolate. **Leaves** 1.5–9.4 cm long; leaflets 13–21, 2–10.3 mm long, linear, elliptic to oblanceolate, acute or obtuse, glabrate or pubescent adaxially. **Peduncles** 3–18 cm long, straight or curved; the racemes mainly long, 3–18 cm long, flowers 13–65, pendulous. **Flowers** ochroleucous, pale yellow to lilac, lilac-white, lilac-purple, dull purplish, *violet, turning yellow or yellowish with purple tones to blue, blue-purple or even blue-violet when drying, sometimes the banner violet veined at center; the calyx 2.6–3.6 × 1.4–1.8 mm, strigose, trichomes white and black mixed, the tube 1.5–2.1 mm long, the teeth 0.4–1.5 mm long, triangular to subulate; the banner 4–6 × 2.4–3.5 mm, recurved, ovate, ovate-rhombic to rhombic, shallowly or markedly retuse distally; the wings 3.8–6 × 1.2–2.2 mm, the claw 1.6–2 mm long, the blade 2.7–5 mm long, oblanceolate to elliptic; the keel 3.4–4.7 × 1.4–1.8 mm, the claw 1.3–2.3 mm long, the blade 2.1–2.8 mm long, oblanceolate to elliptic, incurved. **Pod** 3.1–6 (7.8**) x 1.8–2.7 mm, pendulous, sessile, persistent when mature or tardily deciduous, semi-ovate, triquetrous to trigonous, somewhat inflated but trigonous-shaped, basally rounded, the apex with a short beak, ventrally keeled, dorsally shallowly to wide sulcate, lateral faces rounded, inflate, the valves papery, septum complete, the pod thence bilocular, the valves green, brown to ochre, densely pubescent, the trichomes white and black; ovules 4–8; seeds to 2 mm long, mitten shape, purple or olive.

Distribution:—Endemic to Mexico. Mountains of northern Mexico, from southern Chihuahua (Parral and Guadalupe y Calvo), western (Topia and Canelas), central (Santiago Papasquiaro and Tepehuanes) and central-eastern (Pajaritos, Yerbaníz and Durango) Durango to northern (Guadalupe) central (Fresnillo) and southern (El Sauz and south Las Tinajas and La Saladita) from Zacatecas, south-central Aguascalientes (between Calvillo and Aguascalientes), and rare in Nuevo León (Santiago). Formerly unknown to the mountains of northeastern Mexico, it is the first record of the species for this part of Mexico (Fig. 9).

Habitat:—Loose disturbed patches; plains and slopes with calcareous and stony yellow, shallow soils; limy roadbanks; gullied calcareous shale hillsides; grassland-scrub, mountain grasslands and coniferous forest; associations of pine-oak-madrone-juniper; oaks forest; juniper-acacia forest; areas with disturbance, with weeds in cultivated areas, along the road; 1750–2105 m.

Comments:—Species easily distinguishable from others by its triquetrous but inflated, sessile and small pod. Morphologically similar to *A. vaccarum*, but this species has leaflets (3–24 mm long), wings (4.9–7 mm long) and linear-elliptic to lanceolate and larger pod (6–12 mm long). *Zacatecas, *E. D. Enriquez 413* (MEXU), ***Spellenberg 10721* (CIIDIR, NY).

Specimens examined:—AGUASCALIENTES: 3 November 1959, Road to Calvillo, 19–20 miles west of Aguascalientes, *R. McVaugh, W. Koelz 91* (CAS, MEXU, NY); 24 August 1960, 30 km al W de Aguascalientes, sobre el caminoa Calvillo, *Rzedowski 14024* (ENCB). **CHIHUAHUA:** 12 July 1986, on the road to Guadalupe y Calvo 19 km W of junction with Higway 12, ca 27 km W of Hidalgo de Parral, shaley hills, *R. Spellenberg s.n.* (NY); 3

October 1965, 5 miles w. of Parral, *H. D. Ripley 13932, R. C. Barneby* (CAS, MEXU, NY, US); 20-VII-1983, Creel, in rocky hill, *Y. Saiki M-40* (ENCB). **DURANGO:** 30 August 1989, 4 km de Tepehuanes, sobre el camino Tepehuanes-Guanacevi, *A. Benítez P. 718* (CIIDIR, IBUG); 6 October 1943, Near Yerbanis, *H. S. Gentry 6939* (NY); VIII-1898, Ramas to Lude, *E. W. Nelson 4708* (NY, US); 28 July 1944, Tepehuanes, *G. L. Fisher 44277* (NY); 18 September 1982, 111 road mi. NW of Santiago Papasquiaro, on road to Topia, 5 mi. W of Cienega Nuestra Senora, *R. W. Spellenberg 6715, J. Zimmerman* (NY); IV/VIII-1896, Santiago Papasquiaro and vicinity, *E. Palmer 440, 441* (NY); 23 August 1983, Santiago Papasquiaro, grounds of Escuela Jose Ramon Valdez, *R. Corral 570, R. D. Worthington 11316* (NY); 16 July 1982, Loc. 16 km, del Entronque de la Brecha a Topia con la Carr. Santiago Papasquiaro-Tepehuanes, *P. Tenorio L. 1022, C. Romero de T.* (MEXU, NY); 17 September 1972, On low gypsum hills about 0.5 mile northeast of El Sombretella, about 15 miles southeast of Cuencame along Mexico Highway 49, *J. L. Reveal 3140* (NY); 29 July 1985, Mezquital—Los Arcos (Aprox. 11 Km. de La Guajolota), *I. Solis 74* (MEXU). **NUEVO LEÓN:** near San Losé de las Boquillas, gypsum soils, 18 July 2010, *Hinton et al. 29171* (ANSM). **ZACATECAS:** 17 October 1990, 50 km NW of Fresnillo, on Hwy 49, road cut to hilltop, lime roadbank, *R. Spellenberg 10721, M. Mahrt* (CIIDIR); 15 October 1965, 3 miles s. of El Sauz, *H. D. Ripley 14146, R.C. Barneby* (CAS, MEXU, NY, US).

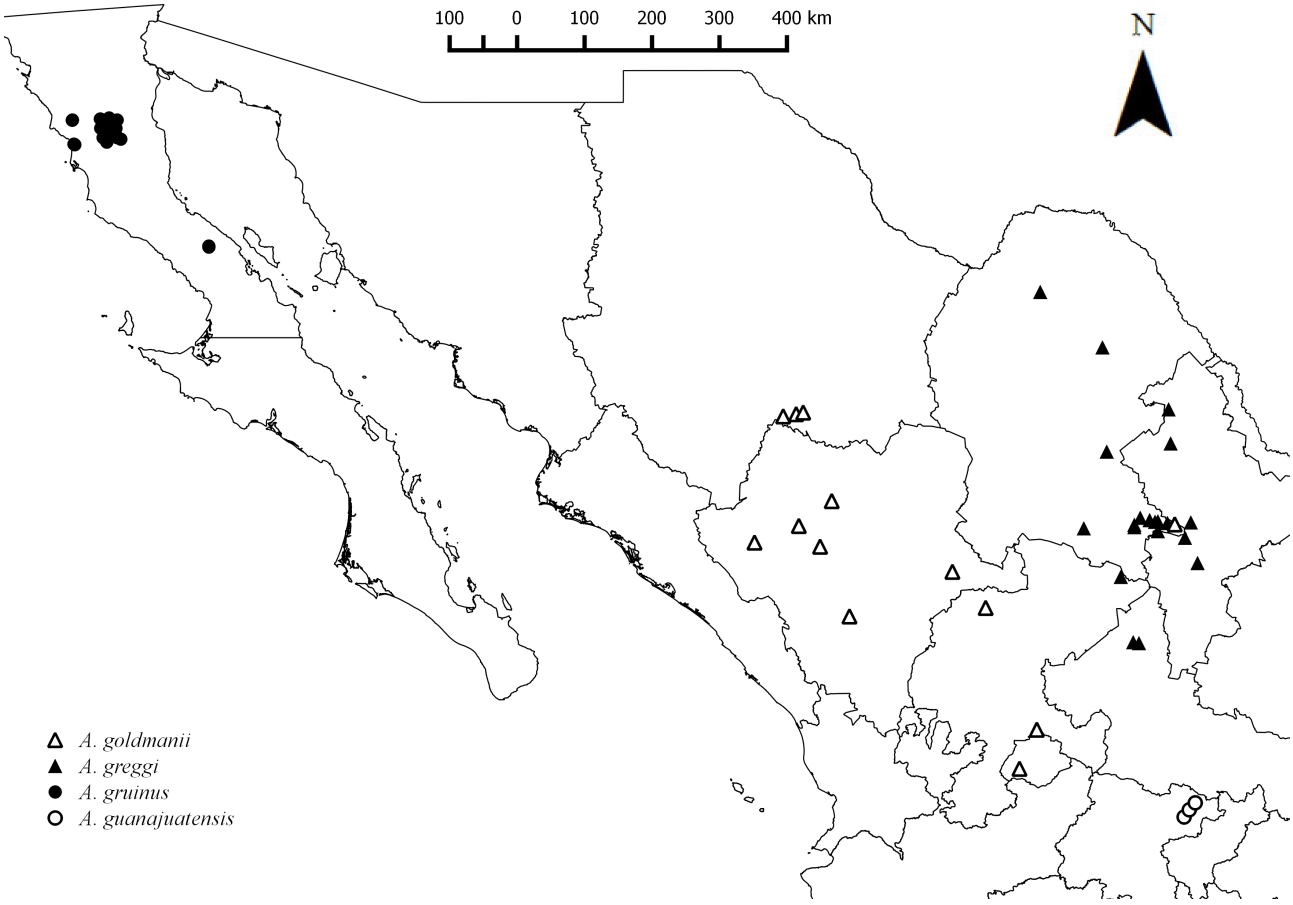

FIGURE 9. Map showing the distribution of *Astragalus goldmanii, A. greggii, A. gruinus,* and *A. guanajuatensis* in Mexico.

32. *Astragalus greggii* S. Watson, Proc. Amer. Acad. 17: 343. 1882

Type:—MEXICO, Coahuila, 6 miles E of Saltillo, 17/20 July 1880, *Palmer 238* (holotype: not seen; isolectotype: *Palmer 238* NA0095610 digital image!; isotype: NY00005796!; syntype: Mexico, 1848, *J. Gregg 439* GH00059413 digital image!, Coahuila, 6 miles east of Saltillo, 17/20 July 1880, *Palmer s.n.* PH00005443 digital image!; isosyntype: *Palmer 238* US00004138 US digital image!, mountains E of Saltillo, February/October 1880, *Palmer 258* MICH1107108 digital image!).

Hamosa greggii (S. Watson) Rydb., Bull. Torrey Bot. Club 54: 20. 1927.

Perennial. Stems up to 65 cm long, decumbent, creeping, diffuse, mostly branched and divaricatelly flexuose, the stems frequently in zig-zag, hispid-pubescent, the trichomes up 1.3 mm long, abundant, dense, perpendicular to the

organ or retrorse, most evident in basal stems, petioles and peduncles, denser in young parts. **Stipules** 1.5–2.3 mm long, dimorphic, the lowest connate, the upper ones 2.5–7.5 mm long and free, lanceolate to deltoid. **Leaves** 2–11 cm long; leaflets 11–23, 3–22 mm long, ovate, ovate-oblong, oblong to obovate, entire and truncate, rounded to retuse, texture thin. **Peduncles** 2–13 cm long, extended or curved; the racemes 1–2.5 cm long, flowers 3–9. **Flowers** pink, purple, pale purple, becoming quickly ochroleucous or the petals ochroleucous and remaining so until drying; the calyx 5–6.7 × 2.3–2.6 mm, campanulate, oblique, hirsute, the trichomes white, the tube 2.1–2.6 mm long, the teeth 2.5–4 mm long, subulate to lanceolate, ventral pair the shorter; the banner 7.2–10.2 × 5.3–7.7 mm, recurved; the wings 7.2–9.2 × 2–2.7 mm, the claw 1.7–2.5 mm long, the blade 6.2–7.5 mm, oblique, oblong; the keel 6–7.2 × 2.3–2.9 mm, the claw 1.8–2.5 mm, the blade 4–5 mm long, semicircular. **Pod** pendulous, *stipitate (the stipe 0.2–3 mm long), or sessile, 1–1.8 × 0.3–0.4 cm, horizontal or ascending, slightly curved, narrowly oblong, triquetrous, laterally compressed or slightly rounded, narrow dorsally grooved, the valves thin, papery, glabrate, ochre o completely black with age, soflty reticulate, septum complete, thence, the pod bilocular, persistent; ovules 9–18; seeds 2.5–3 mm long, mitt-shaped, light-brown, brown.

Distribution:—Northeast Mexico, Coahuila (Múzquiz and Monclova), Nuevo León (Linares and Bustamante) and San Luis Potosí (Real de Catorce). *Estrada *et al.*, (2016) (Fig. 9).

Habitat:—Mountains, low hills, calcareous, alluvial and stony soils, metamorphic rocks, ravines, wet canyons, wet gullies, shaded areas; associated with *Agave-Opuntia*; piedmont scrub; oak forest;oak-pine forest; pine-cypress-oak-sycamore-poplar-association; oak-maple-necklacepod association; maguey, stool and agrito; *Quercus* forest; maple and broad leaved association; abandoned and disturbed crop areas; juniper-oak forest; pine-juniper forest; 580–2600 m.

Comments:—Species easily discernible by the presence of hispid pubescence bearing long perpendicular or retrorse trichomes on stems and petioles. Two other related species, *A. rupertii* and *A. pomphocalyx*, with this type of pubescence are distributed in arid habitats of northeastern Mexico (Villarreal & Carranza, 1994). They can be distinguished from *A. greggi* by the size and shape of the pod, in both of these later species, the pod is pendulous, shorter (less than 1 cm) inflated, strigose and partly covered by the calyx, the teeth shorter than the tube.

Specimens examined:—COAHUILA: 17 September 1999, *J. A. Villarreal 8851, M. A. Carranza, D. Riskind J. Henrickson, T. Wendt, W. Wagner* (ANSM, IEB, TEX-LL); 9 May 1986, Sierra Potrero de Ábrego, camino Los lirios a Laguna de S´panchez, aproc. 15 km al NE de Los lirios, *J. A. Villarreal 3249, M. A. Carranza* (ANSM, ENCB, IBUG, IEB); 2 August 1979, Puerto San Lorenzo, Cerro La Campana, Sierra Hermosa, Arteaga, *L. Arce, s.n.* (ANSM); 3 August 1995, Sierra de Zapaliname, cañon de San Lorenzo, aprox. 3 km al SE de Saltillo, *M. A. Carranza 2216, J. Encina* (ANSM, CIIDIR, MEXU); 31 August 1997, Sierra Rancho Nuevo, Cañón de San Juan, aprox. 2 km al N de San Juan, *M. A. Carranza 2605, L. Zamora, D. Sánchez* (ANSM); 21 July 2015, Sierra de Zapalinamé, entrada al canon de Las Terneras, al sureste de ejido La Angostura, *J. A. Encina 4934, J. M. Cárdenas, R. Monroy B.* (ANSM, MEXU); 20 June 1984, Arteaga, Los Lirios aprox. 35 Km. al Noreste de la carretera Nacional (57), *J. A. Villarreal 2790, M. A Carranza, M. Vázquez* (MEXU); 20 March 1992, Cañón de San Lorenzo, 4 km al sur de Saltillo, *J. A. Villarreal 6334, M. A Carranza* (ANSM, TEX-LL); 21 March 1992, Sierra de Arteaga, carr. 57, 3 km pasando el entronque a Los Lirios, *J. A Villarreal 6461, M. A. Carranza, M. D. García* (ANSM, MEXU, TEX-LL); 17 VII-1880/20 July 1880, Mountains 6 mi E of Saltillo, *E. Palmer 238* (NY)**;** 24 August 1975, Coahuila , Rincon de Maria, *T. L. Wendt 1305, E. Lott, D. H. Riskind* (NY, TEX-LL); 30 March 1973, about 6 km airline W. of Saltillo, E. extremity of the Sierra de La Vega, at and below Estacion Microondas La Vega, *M. C. Johnston 10501A, T. L. Wendt, F. Chiang* (NY, TEX-LL); 30 June 1936, *F. L. Wynd 375,* Rancho Agua Dulce; moist wooded canyon on the eastern slope of the Sierra de San Manuel, *C. H. Muller* (NY); 22 July 1934, San Lorenzo Canyon, South of Saltillo, Sierra Madre Oriental, 1800–1900 m, *F. W. Pennell 17497* (NY); 3 August 1973, ca 35 (air) miles S of Monclova, in small side canyon, *Henrickson 11756* (IEB, MEXU); 27 April 1975, Rincón de Maria, on Hacienda La Babia, which is ca. 70 mi. by road NW from Muzquiz: fairly steep NE-facing slopes S. of "Slump Srping" in SW part of Rincón, *T. Wendt 909, D. Riskind* (MEXU);. **NUEVO LEÓN:** 16 June 1994, Rancho Chaparral, Mpio, Santiago, *Hinton et al. 24374* (ANSM, IEB, MEXU, TEX-LL); 24 April 1981, Santa Rita, Mpio. Galeana, *Hinton et al. 18164* (ANSM, CIIDIR, ENCB, IEB, MEXU, TEX-LL); 10 October 1984, Áreas cercanas a Cola de Caballo, Mpio, Santiago *J. A. Villarreal 3007, M. A. Carranza, M. Vázquez* (ANSM); 7 June 1988, San José de la Martha, árweas próximas al ejido, *J. A. Villarreal 4370, M. A. Carranza, M. Vázquez, D. Markwalder* (ANSM); 15 April 2001, Km 14 por la brecha de Bustamante rumbo a Minas Viejas, Mpio. Villa Aldama, *E. Estrada 12356* (CFNL); 9 April 2001, Sierra Lampazos, por la entrada a minas de yeso de Lampazos, Mpio. Lampazos, *E. Estrada 12002 et al.* (CFNL)**. SAN LUIS POTOSÍ:** 17 May 1973, 1 km. by winding road below and W. of Real de Catorce, on road to Estacion Catorce; above Sacavnon La Purisima, *M. C. Johnston 11067D, T. L. Wendt, F. Chiang C.* (MEXU, NY); 25 August 2013, Parte alta del Cerro Quemado, Mpio. CCCCatorce, *S. Zamudio*

16417 (IEB). **ZACATECAS:** 22 September 1973, 16 (air) miles E of Concepcion del Oro, on upper north side of Sierra del Astillero, ca 3 miles NE of Guadalupe Garceron, ½ mile N of summit, *J. S. Henrickson 13362* (MEXU, TEX-LL).

33. ***Astragalus gruinus*** Barneby, Mem. N. Y. Bot. Gard. 13: 848. 1964

Type:—MEXICO, Baja California, Vallecitos, Sierra San Pedro Martir, 21 September 1930, *Wiggins & Demarée 4969* NY00005797!; isotype: CAS0000954 digital image!, GH00059414 digital image!, LA00000099 digital image!).

Perennial. Stems 30–65 cm long, hard, commonly branched at base, erect to ascending, sometimes decumbent, spreading, tiny strigose, the trichomes up to 0.6 mm long, appressed, straight. **Stipules** 2–5 mm long, clasping o semi-clasping, not connate, papery with age, triangular. **Leaves** 6–13 cm long, leaflets 9–25, 5–16 mm long, lanceolate, oblong to elliptic, acute, obtuse or retuse distally, glabrate or pilose adaxially. **Peduncles** 5–9 cm long, curved and ascending; the racemes 2–5 cm long, flowers 10–18. **Flowers** purple, lavender, cream but with considerable blue and lavender tints on wings and banner, sometimes the banner lavender and the wing and keel white or the flowers blue-violet; the calyx 5.3–6.9 × 2.2–3.2 mm, densely strigose, the trichomes black and few white mixed, sometimes only white trichomes, the tube 3–4 mm long, the teeth 2.3–3 mm long, subulate; the banner 8.4–11 × 5.3–7 mm, recurved, rhombic to ovate, narrowed basally, wide retuse apically; the wings 8.2–10.6 × 2–2.5 mm, the claw 3.2–3.8 mm long, the blade 5.5–7.2 mm long, oblong, half lunate; the keel 7–8.6 × 2–2.7 mm, the claw 3.3–3.8 mm long, the blade 4–5.3 mm long, triangular, strongly incurved. **Pod** 1.8–2.8 × 1–1.5 cm, sessile, subglobose to ovoid, inflated bladder-like, rounded basally, apically contracted and ending in a 2–2.5 mm long beak, slightly sulcate ventrally, the valves tiny strigose pale green or with purple spots, papery, sublustrous, softly reticulated, septum absent; ovules 24–26; seeds 2.6–2.9 mm long, mitt-shaped, the notch shallow to deep, brown, opaque.

Distribution:—Endemic to Mexico. Restricted to the Sierra San Pedro Mártir (Yerbabuena, Vallecitos, La Encantada, near the Observatory), and the Sierra La Asamblea and Rancho San Luis) in Baja California (Fig. 9).

Habitat:—Rocky slopes, gravelly, sandy and granitic soils; granite boulders; steep walled canyons; shaded crevices and bases of outcropings; dry sands in canyon floor; dry sandy soils of meadow; hillsides and outwash slopes, grasslands, oak-forest, pine-oak forest; pine-manzanita; pine-fir; pine forest, associations with pine-manzanita; 1750–3213 m.

Comments:—*Astragalus palmeri* and *A. gruinus* are sympatric and converge at the same altitudes in both, oak and conifer forests of the Sierra San Pedro Mártir, although *A. palmeri* inhabits mostly in lower elevation plant communities. Both species share several characters in common such as purple flowers, (sometimes pink-purple or shiny-pink in *A. palmeri*), sessile and inflated pods, however, *A. palmeri* has commonly longer racemes, reaching up to 21 cm long, and the pedicel is persistently attached to the plant when fruit ripens and fall, while in *A. gruinus* the pedicel (together with calyx and fruit) is detached from the plant falling as a unit. *Astragalus douglasii* also has sessile and inflated pods, but differs significantly from the two aforementioned species by its white, yellow, or ochroleucous flowers.

Specimens examined:—BAJA CALIFORNIA: 28 June 1996, Sierra San Pedro Martir, Vallecitos area; 1.7 miles north of turn to La Tasajera and 2.2 miles southeast of observatory road, *J. Rebman 3254* (BCMEX, SD); 30 August 1963, Sierra San Pedro Mártir. La Corona, *R. V. Moran 11268* (MEXU, NY, SD); 2 June 1975, San Isidoro, *R. V. Moran 22306* (NY); 15 July 1905, Vallicitos, San Pedro Martir Mountains, *E. A. Goldman 1224* (NY); 8 May 1986, Sierra San Pedro Mártir: a few miles below entrance to Parque Nacional, *R. F. Thorne 62007, T. S. Elias, P. Rojas* (NY); 18 August 1967, Sierra San Pedro Mártir. La Encantada, *R. V. Moran 14309, R. F. Thorne* (NY, SD, TEX-LL); 21 September 1930, Vallecitos, Sierra San Pedro Mártir, *I. L. Wiggins 4969, D. Demarée* (NY); 18 June 1985, Vallecitos: near road to Observatory and camp-ground, *R. F. Thorne 60837, R. Dahlgren, S. Boyd and D. Charlton* (NY); 19 June 1985, Parque Nacional San Pedro Martir, observatory Mt: Near Observatory, *R. F. Thorne 60900, R. Dahlgren, S. & D. Charlton* (MEXU, NY); 18 September 1983, Rocky slopes around observatory near E crest of Sierra San Pedro Mártir, *R. F. Thorne 57269, K. Kubitzki, P. Paterson, C. Annable* (CAS, NY); 4 September 1961, Sierra San Pedro Mártir. Southeast side of La Encantada meadow, *I. L. Wiggins 16620* (CAS, NY); 18 June 1981, On shoulder of new road to Observatory 6.1 miles west of Vallecitos Meadow, Sierra San Pedro Mártir, *I. L. Wiggins 21485* (CAS, ENCB); 24 September 1930, High peaks above La Grulla, Sierra San Pedro Martir, *I. L. Wiggins 5035 and D. Demaree* (CAS, MEXU, NY); 16 June 1954, 7 miles from canyon mouth, Canyon del Diablo to the north and west of Picacho del Diablo (Cerro La Encantada) eastern flank of Sierra San Pedro Martir, *K. L. Chambers 608* (CAS); 18 September 1930, Margins of Meadow at La Encantada, Sierra San Pedro Martir, *I. L. Wiggins 4890, D. Demaree* (MEXU, NY, US); 5

September 1961, Sierra San Pedro Mártir. On trail from La Encantada to rim of range, *I. L. Wiggins 16627* (CAS, NY); 16 August 1967, Sierra San Pedro Mártir. Yerba Buena, *R. Moran 14133, R. F. Thorne* (CAS, ENCB, NY); 22 August 1972, Sierra San Pedro Mártir Natl. Park. ca. ½ mi inside park entrance; ca. 21 mi E of Meling Ranch, *B. Moulis 554, L. McGill* (NY); 12 August 1979, Near pond by Río Santo Domingo north of Villa Guerrero, *R. Moran 27984* (CAS, NY, SD); 14 September 1968, Sierra San Pedro Mártir. On north slope of Cerro "2828", *R. Moran 15625* (MEXU, NY, US, SD); 18 May 1972, La Encantada Meadows, San Pedro Martir, *E. McMillan s.n.* (CAS); 20 September 1968, At the NW end of the Sierra San Pedro Martir 8 miles north of Vallecitos, Municipio of Ensenada, *D. E. Breddlove 16347* (CAS); 16 June 1954, 7 miles from canyon mouth, Canyon del Diablo to the north and west of Picacho del Diablo (Cerro La Encantada) eastern flank of Sierra San Pedro Martir, *K. L. Chambers 608* (CAS); 18 June 1971, Steep mountain side about 1 km W of teh Observatory above Vallecitos Meadow, Sierra San Pedro Mártir, *I. l. Wiggins 21478* (CAS, ENCB); 18 June 1971, On shoulder of new road to Observatory 6.1 miles west of Vallecitos Meadow, Sierra San Pedro Mártir, *I. L. Wiggins 21485* (CAS, ENCB); 16 August 1967, Sierra San Pedro Martir, above Yerba Buena, *R. Moran 14227, R. F. Thorne* (SD); 27 June 1998, *J. Rebman 5378, A. Russell* (SD); 2 July 1982, Sierra San Pedro Martir, near summit of Cerro de la Cupula (=C.2828), at roadside, *R. Moran 30982* (SD); 18 October 1980, Río San Rafael, Los Zaguaritos, on damp sandy flood plain, *R. Moran 29398* (SD); 9 August 1969, Sierra San Pedro Martir, meadow at Vallecito, *H. Witham 373, F. Hommersand* (SD); 16 June 1988, Sierra San Pedro Martir, 'Corral Meadow', 7.5 km NW (340°) of the observatory; mountainous region of granite boulder-covered slopes with a meadow & small stream, *A. C. Sanders 7912, R. Minnich, E. Franco, M. Salazar* (SD); 2 July 1973, ierra San Pedro Martir, near summit of Cerro Botella Azul, in gravelly soil, *R. Moran 21077* (SD); 3 July 1990. Sierra San Pedro Martir, west slope of Cerro Venado Blanco, in sandy bottom, *R. Moran 31041* (SD); 25 August 1968, Sierra san Pedro Martir, valley in upper Arroyo Copal, on dry forest floor, *R. Moran 15492* (SD); 28 July 1970, Sierra San Pedro Martir, El Alto de Corona, *R. Moran 17910* (SD); 1 July 1998, Sierra San Pedro Martir, Bajio de las Viejas, *J. Delgadillo, s.n.* (SD); 21 July 1988, Sierra San Pedro Martir, Oak Meadow area below entrance station (Cieneguita de Soto), *S. Boyd 2834* (MEXU, SD); 24 April 2004, Sierra La Asamblea: northeast of El Crucero (junction of Hwy. 1 & the road to Bahia de Los Angeles), NNW of Rancho San Luis; along the trail between the ranch & the camp called "Datililo", *J. Rebman 10019* (SD); 30 September 2008, Sierra San Pedro Martir: southeast of Vallecitos and approximately 3 miles south of the Observatory; up a canyon with an intermittent stream en route to Pedro's Dome, *J. Rebman 15984, M. A. Kessler, V. Marshall, M. Dykens* (SD); 12 July 2013, Sierra San Pedro Martir (turnout N side or road, SE of Observatory), *S. Ratay 200* (SD); 8 July 1997, Parque Nacionale Sierra San Pedro Martir, Vallicitos Meadow, extreme western margin, *J. M. Porter 11484* (SD); 16 July 1988, Sierra San Pedro Martir, ca. 1.5 km N of Cerro Observatorio, vicinity of Base Camp number 1, *R. F. Thorne 63376, A. Liston, D. Nordin* (SD); 9 June 2016, Sierra de San Pedro Martir: upper northeastern end of Santa Rosa Meadow, *J. Rebman 31725, S. Vanderplank, A. Harper* (SD); 18 June 1985, Parque Nacional San Pedro Mártir: ca. 3 miles below entrance to parquet, *R. F. Thorne 60805* (MEXU); 29 September 1970, Vallecitos, Parque Nacional, Ensenada, *A. May Nah 3442* (MEXU); 14 September 1968, Sierra San Pedro Martir, *R. Moran 15625* (MEXU); 16 July 1988, *D. Charlton 2198 et al*. (ENCB).

34. ***Astragalus guanajuatensis*** Rzed. & Calderón, Acta Botanica Mexicana 110: 2. 2015

Type:—MEXICO, Guanajuato, San Agustín, municipio de Victoria, sitios húmedos en el pastizal, 30 Juyl1998, *S. Zamudio, E. Pérez y L. Hernández 10772* (holotype: IEB).

Perennial. Stems up to 20 cm long, creeping, diffuse, strigose, trichomes 0.2–0.5 mm long. **Stipules** up to 5 mm long, triangular, ovate to lanceolate, clasping, not connate, embracing completely the stem´s circumference, green, appressed, scattered pubescent, erect. **Leaves** 1.3–4 cm long, leaflets 15–27, 3–7 mm long, elliptic, oblong, linear-oblong to oblanceolate, obtuse or truncate, glabrate adaxially, pilose to densely pilose abaxially. **Peduncles** up to 6 cm long; the racemes 2–3 cm long, flowers 12–18. **Flowers** yellow-greenish, ascending when young, soon deflexed; the calyx 3 × 1.7–1.9 mm, strigose, the trichomes black, the tube 2–2.6 mm long, campanulate, the teeth 1.2–1.5 mm long, triangular; the banner 9–11.2 × 5–6.1 mm, obovate, retuse, recurved, cuneate basally; the wings 4.8–6 × 2–2.5 mm, the claw 2 mm long, the blade 3–4.2 mm long, oblong; the keel 7–8 × 2.2–2.8 mm, the claw 2.4–3.1 mm long, the blade 4.5–5 mm long, incurved. **Pod** 9–13 × 2.5 mm, sessile, pendulous, straight or almost so, triquetrous, lateral faces sub-rounded or compressed, oblong, basally rounded to obtuse, distally contracted in a straight cuspidate, triangular beak, the valves yellowish, strigose, stiff, reticulate; ovules 8; seeds 1.5–1.8 mm long, mitt-shaped, square to sub-squared, brown, opaque.

Distribution:—Endemic to Mexico. Restricted to Guanajuato, Cañada de Moreno-Xichú, Municipality, between San Agustín and Puerto de Palmas (Rzedowski y Calderón, 2015) (Fig. 9).

Habitat:—Open areas in oak-pine forest and grassland in Sierra Gorda.

Comments:—Of the several species of *Astragalus* with triquetrous pods and simple pubescence that are found in Guanajuato and adjacent areas, only *A. guanajuatenesis* and *A. strigulosus* (white, white-yellowish flowers) do not have purple, blue or a red-lilac combination in the flowers. These species can be separated based on their pod morphology since, *A. strigulosus* is stipitate and little longer, 1.7–2 cm long.

Specimens examined:—GUANAJUATO. 30 July 1998, San Agustín, municipio de Victoria, *S. Zamudio, E. Pérez y L. Hernández 10772* (IEB); 15 July 2011, Puerto del Aire, km 28 carr. Cañada de Moreno-Xicho, Mpio. Vicrtoria, *P. Carrillo-Reyes,E. Carranza 6355* (IEB); 15 July 2011, 1 km al SO de Derramaderos sobre el camino San Agustin-Puerto de Palmas, Mpio. Victoria, *P. Carrillo-Reyes,E. Carranza 6339* (IEB).

35. *Astragalus guatemalensis* Hemsl., Biol. Centr.-Amer. Bot. 1: 266. 1880

Perennial. Stems 7–220 cm long, prostrate, rhizomatous, creeping, decumbent, or erect when 60 cm long, sometimes with red tints. **Stipules** 1.5–9 mm long, clasping, the lowest ones connate for almost the half of its length, ending in a bidentate sheath, the upper ones basally connate or semi-clasping, lanceolate, acuminate. **Leaves** 2.1–13 cm long, leaflets 11–37, not always opposite to each other, 2–26 mm long, oblong elliptic to obovate, truncate or retuse distally, sometimes mucronate, thin, bicolored, light-green abaxially, glabrate, scattered pubescent or densely pubescent all over or only in the midvein adaxially. **Peduncles** 3–26 cm long, thin, ascending or incurved; the racemes 0.5–5 cm long, flowers commonly 6–30. **Flowers** rose, lilac, purple or purple-blue, pale yellow, yellow-cream, occasionally yellowish, yellow-greenish or white with lilac tints, soon deflexed to ascending-horizontal; the calyx 3.2–7.8 × 2.2–3.5 mm, pubescent, regularly with black trichomes, rarely white, the tube 2.6–4 mm long, the teeth 0.6–4 mm long, subulate, triangular to widely triangular; the banner 8.5–12 × 4.4–7 mm, ovate, obovate to rhombic, retuse or almost so; the wings 8–10.5 × 1.6–2.8 mm, the claw 3.2–4.6 mm long, the blade 6.2–8 mm long, narrowly oblong; the keel 6.8–8.3 × 2.1–2.7 mm, the claw 3–4.6 mm long, the blade 3.6–4.7 mm long, semi-obovate, sharp. **Pod** stipitate (the stipe 1–5 mm long), 1.2–2.1 x 0.4–0.8 cm, oblong to elliptic, dorsoventrally compressed, ventrally carinate, dorsally openly sulcate, inflated, but no bladdery-shape but bulged, straight or semi-curved, very rarely triquetrous****, narrowed in both ends, the valves glabrate to minute strigose, the trichomes black, the valves papery, black or turning ochre with age, softly reticulate, septum complete, the pod thence bilocular or partial so, opening dorsally in its total length; ovules 10–20; seeds 1.7–2.5 mm long, brown.

Distribution:—Central and southern Mexico, from northern Hidalgo and central Jalisco, through Michoacán, Estado de Mexico, Morelos, Guerrero, southern Puebla, Oaxaca to central Chiapas.

Comments:—*Astragalus guatemalensis* has a wide distribution in the mountains of southern Mexico. At least 11 other species with clasping and connate stipules, linear, elliptic, oblong, obovate, or bulged, but never triquetrous pods inhabit these areas. Several species in the region have stipitate pods such as *A. jaliscensis, A. hintonii, A. strigulosus* and *A. tolucanus*. *Astragalus strigulosus* and *A. guatemalensis* have short calyces, 6 mm long or smaller. *Astragalus strigulosus* has erect stems and ochroleucous and immauclate flowers, and longer calyx teeth, 2.5–4.3 mm long (at least in areas where both species converge (Guerrero, Oaxaca, Puebla and Oaxaca, except for Hidalgo). In Hidalgo, *A. strigulosus* and *A. guatemalensis* var. *lozani* are sympatric, but they have different habitat preferences because, *A. strigulosus* predominates in sunny areas, while *A. guatemalensis* var. *lozani* prefers wet areas.

Three varieties recognized based on stem and calyx size, and pubescence type.

1. Stems up to 29 cm long; pubescence of short and appressed trichomes mixed with longer and straight ones; the stipe 3.5–5 mm long; locally distributed in Hidalgo ..... ***A. guatemalensis* var. *lozanii***
- Stems 30 cm or longer; pubescence of short appresed trichomes only; the stipe shorter, 1–2.5 mm long; wider distribution 2
2. Calyx 3.2–6 mm long; the teeth 0.6–2.5 mm long; Colima, Jalisco, Hidalgo, Guanjauato, Michoacán, Nayarit, Guerrero, Estado de Mexico, Morelos, Puebla, Guerrero and Oaxaca ..... ***A. guatemalensis* var. *brevidentatus***
- Calyx 6.4–7.8 mm long; the teeth 2.8–4.5 mm long; Chiapas ..... ***A. guatemalensis* var. *guatemalensis***

35.1. ***Astragalus guatemalensis*** Hemsl. var. ***brevidentatus*** (Hemsl.) Barneby, New York Bot. Gard. 13: 154. 1964

Type:—MEXICO, Hidalgo?, cultivated specimens in hort, Kew, 13 August 1838, (holotype? (en JSTOR dice isotype): K 000478281 digital image!).

Astragalus strigulosus var. *brevidentatus* Hemsl., Biol. Centr.-Amer. Bot. 1: 266. 1880. *Phaca elongata* M. Martens & Galeotti, Bull. Acad. Roy. Brux. 10**:** 51. 1843 (non *Astragalus elongatus* Willd. 1803).

Astragalus guatemalensis var. *oaxacanus* M. E. Jones, Rev. N.-Amer. *Astragalus* 189. 1923.—*Atelophragma oaxacanum* (M. E. Jones) Rydb., Bull. Torrey Bot. Club 55: 160. 1928.

Astragalus painteri M. E. Jones, Rev. N.-Amer. *Astragalus* 190. Pl. 43.l 1923.—*Atelophragma painteri* Rydb., Bull. Torrey Bot. Club 55: 156. 1928.

Stems reaching 2.4 m long, frequently decumbent, rarely with erect habit; calyx teeth 0.6–2.5 mm long, triangular to subulate. Sometimes is very abundant in some areas.

Distribution:—This variety is the most widely distributed in Mexico, almost with the same distribution of the species, Jalisco, Hidalgo, Michoacán, State of Mexico, Morelos, Puebla, Guerrero and Oaxaca, except Chiapas (Fig. 10).

Habitat:—Volcanic, stony soils; pronounced slopes; glen hillsides; wet slopes; low bush gullies; oak forest; oak forests associated with grasslands; scrub adjacent to streams; pine-oak forest; fir forest; cloud forest; moist broad-leaved forests; associations of fir*,* oak, palo casita; pine-fir forest; pine-oak wet forest with ash tree; cultivation areas; roadside; 2100–3150 m.

Specimens examined:—COLIMA: 27 September 1997, Vertiente sur del Volcán de fuego, 10 km por aire NW de Queserías, Ejido Queserías*, R. Cuevas G. 5728* (MEXU). **ESTADO DE MEXICO:** 31 August 1952, Valle de Bravo. Carretera, Valle de Bravo-Colorín*, E. Matuda 26983 et al* (MEXU, NY); 10 February1936, Hornos, *G. Hinton 8912* (NY); 2 October 1969, Hansen's, *P. Fryxell 1129* (NY); 8 January 1955, Valle de Bravo, Rio del Salto, Avendero*, M. Carlson 2893* (MEXU, NY); 6 January 1972, 5.3 mi. W of Village of Meson Viejo, on road to Temescaltepec*, D. B. Dunn 18911, D. Dunn* (NY); 6 January 1979, Top of Sierra de Manantlán, 0.5–1 km NE of houses at Zarza Mora ("Blackberry"), ca. 2 km E of Las Joyas, 6 km WSW of Rincon de Manantlán, 15 km SSW of EL CHANTE*, H. H. Iltis 1274, R. Guzmán, M. Nee* (ENCB, MEXU, NY, TEX-LL); 12 October 1985, 13.2 km N of Temascaltepec on the road to Valle de Bravo, *B. Bartholomew 2969, L. R. Landrum, H. W. Li, T. S. Ying* (CAS, MEXU, NY); 11 November 1972, *Rzedowski 28802* (CAS, ENCB); 4 September 1965, *Rzedowski 20819* (CAS, ENCB); 21 November 1967, La Cruz del Rosario, 7 km al NW de Taxco, sobre el camino a Tetipac, *J. Rzedowski 25228* (ENCB, NY); 28 May 1950, Valle de Tres Cumbres*, E. Matuda 18841* (ENCB, MEXU, NY); 20 November 1933, Nanchititla, *G. B. Hinton 5232* (MEXU, NY); 18–22 October 1954, Cerro de Pinal Otzoloapan*, E. Matuda 31834* (MEXU, US); 30 October 2011, Coatepec Harinas, San Miguel, *F. D. Dorantes 330, I. V. Piña D., D. Tejero D.* (MEXU); 4/12 December 1954, Cañada de Nanchititla*, E. Matuda 32013* (MEXU); 2 August 2002, Cerro Nepanapa, por la terracería que va a la CabañaPelagatos, Área Natural Protegida Nepanapa, *F. César G. 365* (MEXU); 25 November 2011, Cerro Gordo Lugar dentro del Rancho: Camino a la Escalerilla a Barranca Onda, *J. Canek L. 2095* (MEXU24 September 1987, Terracerìa Ocuilàn-Cuernavaca km 10–18, *J. Castañed R. 586* (MEXU); 26 September 1978, 12 km al E de Amecameca*, I. Piña 100* (ENCB); 29 September 1968, *Rzedowski 26742* (ENCB); 3 September 1967, *J. López G. 110* (ENCB); 16 November 1980, *V. Pliego 151* (ENCB); 10 March 1973, *S. Moreno G 44* (ENCB); 5 December 1976, *E. Espinosa M. 223* (ENCB). **GUANAJUATO:** 26 September 1985, Acámbaro, *A. Rubio 162* (ENCB, CIIDIR, IBUG, MEXU). **GUERRERO**: 21 November 1967, La Cruz del Rosario, 7 km al NW de Taxco, sobre el camino a Tetipac, *J. Rzedowski 25228* (ENCB, NY); 1 December 1963, 26 November 1939, Yesceros-Cruz Pacifica*, G. B. Hinton 14899, et al.* (ENCB, NY, TEX-LL, US); 1 December 1963, About 10 km west of Camotla, Municipio de Chichihualco, about 40 km west of Chilpancingo, *C. Feddema* (CAS, IEB, MEXU, NY); 25 January 1998, Parque El Huizteco, 4 km al NE de la entrada, *J. Calónico S. 7247* (MEXU); 11 February1982, 6 km al NW de Omiltemi. Brecha Chilpancingo-Oniltemi-Las Joyas, *P. Tenorio L. 2596, C. Romero de T., E. Martínez S., R. Torres C.* (IEB, MEXU); 28 November 1997, Puerto Obscuro, 15 km de la desviación*, L. Calónico S. 6342* (MEXU); 25 October 1997, Parque El Huizteco, alrededores del Monumento al Viento, *M. Martínez G. 2105* (MEXU); 25 October 1997, Parque El Huizteco, alrededores del Monumento al Viento, *M. Martínez G. 2128* (MEXU); 24 October 1997, San Miguel Huertas, 6 km al E, camino San Juan Tenerías-Taxco, *R. Cruz D. 1741* (MEXU); 27 February1998, El Tejocote, entre Taxco y Puerto Obscuro, *R. Cruz D. 2075* (MEXU); 5 October 1998, Verde Rico, 2.3 km al N, camino a La Cienega*, R. Cruz D.* (MEXU); 20 August 1997, Agua Escondida, 10 km al O, rumbo a Puerto Obscuro, *M. Martínez G. 1643* (MEXU); 28 October 1997, Balsamar, entronque, *B. González H. 1633* (MEXU). **HIDALGO:** 4 October 1980, 5 km. al Noreste de Trancas, hacia

Nicolás Flores, *R. Hernández Magaña 5030, D. Rodríguez* (CAS, ENCB, MEXU); 30 December 1970, S. of San Luis Potosi boundary, Hwy 85, *D. B. Dunn 17462, Harmon, Walker* (ENCB, NY); 30 December 1970, S. of San Luis Potosi boundary, Hwy 85, *D. B. Dunn 17462* (NY); 28 July 1990, 29 km al NE de Jacala, 1 km al SO de Puerto Horcones, aprox. km 191 carr. Federal 85 México-Nuevo Laredo, *H. Ochoterena 61* (MEXU); 28 December 1970, *D. B. Dunn 17309, Walker, Enright* (ENCB). **JALISCO**: 29 August 1958, Southeastern slopes of Cerro Gordo, above San Ignacio, ca. 12 miles southeast of Tepatitlán*, R. McVaugh 17499, H. F. Loveland, R. W. Pippen* (CAS, MEXU, NY); 28 November 1959/30 November 1959, Sierra del Halo, near a lumber road leaving the Colima highway 7 miles south-southwest of Tecalitlán and extending southeasterly toward San Isidro, *R. McVaugh, W.N. Koelz 1140* (MEXU, NY); 10 March 1978, Sierra del Alo, Mpio. De Tecalitlán, *M. Soto Ariel s.n.* (IBUG); VII-1992, Camino de los Amoles a Pinos Altos, Mpio. De Mezquitic, *J. J. Reynoso 982, R. Ramírez, L. M. González, R. Rodríguez* (IBUG); 24 July 1991, El Puertecito de los Ladrillos por el camino a La Laguna, 6 km al NE de El Terrro, *F. J. Santana D. de Niz L., M. Wetter, J. Cevallos 5190* (IEB, MEXU); 12 August 1990, Cerro Viejo, Ladera Norte, recorrido de La Cañada a Bola del Viejo, Tlajomulco de Zúñiga, *J. A. Machuca 6300* (IEB, MEXU, TEX); 8 October 1992, Ladera de exposición Norte, Antenas de Microondas, Cerro Gordo, *J. J. Reynoso, Ramírez D. 1044* (IBUG, MEXU); 22 December 1984, Cerro El Almeal y las cercanías, ca. 4–5 km por camino (3 km distancias aérea) al SE de Estación Biológica "Las Joyas", Sierra de Manantlan Occidental, *T. S. Cochrane 10607* (IBUG, MEXU); 18 March 1992, San Antonio, vereda a la Barranca Los Conejos, Cerro Gordo Orilla de arroyo temporal, *L. Portillo, R. Ramírez D., J. J. Reynoso 38* (IBUG, MEXU); 16 August 1986, Near the mocrowave towers atop Volcán Tequila south of Tequila, 13 miles south of México Highway 15 and 11 miles south of the railroad in Tequila, *A. Solis M. 4499* (MEXU); 6 January 1986, camino empedrado a la Estación de Microondas en Tequila, *O. Téllez 9628* (MEXU); 24 June 1970, Tierra Blanca, Cuautla, *C. L. Díaz L. 1700* (MEXU); 2 April 1949, Northern slopes of Nevado de Colima, in pine-oak forest about 1 km. by lumber road above sawmill called Piedra Ancha*, R. McVaugh 10164* (MEXU); 6 October 1984, 8 Km de desviación de la carretera Federal rumbo a Xilotitlán, *J. Reynoso 440, R. Cuevas, N. Cervantes A. y L. M. Villarral de P.* (MEXU); 10 November 1970, Sierra del Halo, 5 km toward San Isidoro on a lumber-road leaving the Colima highway 11–12 km southwest of Tecalitlán, *R. McVaugh 24485* (MEXU); 20 December 1992, *R. Cuevas 4522, L. Guzmán* (ENCB); 8 August 1966, *L. M. Villarreal de P. 678* (ENCB); 4 August 1972, *C. L. Díaz L. 3404* (ENCB); 28 September 2014, Mpio. Tequila, Volca´n de Tequila, 1 km al NE de la estaci+ón de microondas, *M. Anguiano 59* (IEB) . **MICHOACÁN**: 8 September 1989, 1 km al N de Jeráhuaro, camino a Buenavista, *M. J. Jasso 1543* (CIIDIR, IBUG, IEB, MEXU); 11 July 1992, Cerro Mozo, al SW de Ucareo*, E. Carranza 4095* (CIIDIR, IEB, MEXU); 22 September 1988, Presa Pízcuaro, *M. J. Jasso 166* (CIIDIR, IBUG, MEXU28 June 1990, Cerro de Huashán, aprox. 2 km al S de Nahuatzen, *E. García 2730, E. Pérez* (CIIDIR, IEB, MEXU29 September 1986, 1 km al SW de Tlalpujahua. sobre la carretera Tlalpujahua-Méx., *J. Santos M. 1731* (CIIDIR, ENCB, IEB, IBUG, MEXU); 15 September 1987, camino de Rancho Bello al Cerro Pico Azul, *J. Santos M. 2200* (ANSM, CIIDIR, MEXU, TEX-LL); 16 July 1988, 2 km rumbo al Cerro San Miguel, *J. M. Escobedo 1470* (CIIDIR, MEXU); 23 April 1984, Cerca de Mil Cumbres, por la desviación a San Antonio Villalongin, *J. C. Soto 6361* (ANSM, MEXU); 6 March 1983, Cerca de La Laguna Verde, 8 km al SO de Ocampo, *J. C. Soto 4890* (ANSM); 13 October 1983, Cerro Garnica, 51 km al NO de Cd. Hidalgo, sobre la carretera a Morelia por Mil Cumbres, *E. M. Martínez 5446, G. Silva* (ANSM, IEB, MEXU); 2 November 1963, Las Peras, in the mountains 30 mi. east of Morelia, *H. D. D. Ripley 13405, R. Barneby* (NY); 4 October 1940, Tancitaro, Ururapan, *Hinton 15465 et al* (ENCB, NY, US); 26 November 1939, Yesceros-Cruz Pacifica*, Hinton 14899 et al* (NY); 30 January 1939, Coalcomán, *Hinton 12914 et al.* (NY); 9 August 1985, La Herradura, 39 km SE de Asunción Nochixtlán. Distrito Etla, Región Valles Centrales, *R. Torres 7136, L. Torres y C. Martínez* (CAS, MEXU, NY); 5–6 March 1965, Steep limestone slopes near summits 8–12 km. southwest of Aserradero Dos Aguas and nearly west of Aguililla, *R. McVaugh 22784, M. F. Baad, W. R. Anderson, C. W. Laskowski* (CAS, ENCB, MEXU, NY); 22 December 1977, Cuenca Media del Rio Balsas. A 13 km al NE de Uruapan*, J. C. Soto, R. Hernández, R. L. Andrade 495* (ENCB, MEXU, NY); 3 November 1963, 7 miles east of Quiroga, *H. D. Ripley, R. C. Barneby 13425* (CAS, NY, US); 3 November 1963, 7 miles east of Carapan, *H. D. Ripley, R. C. Barneby 13432* (CAS, NY); 16 November 1971, *Rzedowski y McVaugh 536* (CAS, ENCB); 19 November 1971, Las Cañas, estribaciones inferiores noroccidentales del Cerro Patamban, *Rzedowski y McVaugh 620* (CAS, ENCB, MEXU); 11 October 1965, 3 miles s. of Carapan*, H. D. Ripley 14080, R. C. Barneby* (CAS, NY); 3 February2004, sobre la carretera de Villa Madero a Carácuaro, 5.3 km al norte de Los Sauces, *V. W. Steinman 4112* (IEB, MEXU, NY); 15 May 1985, A 1 km al S del mirador Mil Cumbres, municipio de Cd. Hidalgo, *J. C. Soto 8508, S. Aureoles, G. Silva, C. Pzarras* (CAS, MEXU, NY); 25 October 1972, 29 mi. from Uruapan on highway to Patzcuaro, 8 mi. from Patzcuaro, *R. Spellenberg 2966, M. Dunford* (ENCB, MEXU, NY); 14 December 1946, Uruapan, *L. Waitzinger s.n.* (NY); 3 October 1953, about 2- miles west of Morelia in open pine-oak forest, *E. R. Sohns 773* (US); 18 June 1988, *P. X. Ramos 28* (ENCB, IEB, MEXU); 4 December 1985, 4 km al S de Vista Hermosa, Mpio. Zacapú, *A. Martínez L.* (IEB17

August 1991, Cañada del Río Grande, Mpio. Morelia, *E. García 3802, E. Pérez* (IEB, MEXU); 16 July 1984, Cerro El Tecolote*, J. Espinoza Garduño 1622* (IEB, MEXU); 25 January 2004, Mpio. Nuevo San Juan Parangaricutiro, ca. 12 km road E of La Pacata, and 6.8 km road E of Aparicuaro, *J. M. Porter, V. W: Steimnann 13877* (IEB); 4 October 1986, *J. Santos M. 1749* (ENCB, IBUG, IEB, MEXU); 2 March 1986, Salvador Escalante*, Rzedowski 39559* (ENCB, IBUG, IEB, MEXU); 24 November 1988, La Curva del Colorado, camino a las Iglesias, Mpio. Zacapu, *A. Grimaldo N. 423* (IEB); 16 September 1995, cerca del Vivero El Durazno*, C. Medina 2935* (IEB, MEXU); 5 December 1987, San Miguel del Monte, cruce camino a Atécuaro, *C. Medina G. 947* (IEB, MEXU); 29 September 1988, 2 km al E de Jeréhuaro, camino a Huajúmbaro, Mpio. Zinapécuaro, *M. J. Jasso 244* (IEB, TEX-LL); 22 August 1980, A 12 km al N de Parácuaro, carretera Uruapan-Carapán, *J. C. Soto 2398, L. Cortés, A. Román de Soto* (IEB, MEXU); 6 March 1983, Cerca de La Laguna Verde, 8 km al SO de Ocampo, *J. C. Soto 4890* (IEB, MEXU); 27 July 2004, Cerro de la Campana, Ejido Lázaro Cárdenas, Mpio. Hidalgo, *X. Madrigal S. 4, S. Ontiveros A., A. Cervantes G.* (IEB, MEXU); 30 August 1987, *Rzedowski 44310* (ENCB, IBUG); 15 November 2010, Lado W del Cerro El Águila, aprox. 4 km al SE de Iratzio, Mpio. Morelia, *M. Flores Tolentino 142, G. I. Manrriquez, G. Cornejo Tenorio* (IEB, NY); 24 June 1980, 25 km al N de Cd. Guzmán, carr. a El Grullo, *J.A. Solís M. 2286* (MEXU); 13 November 1987, Madero, Poruas, *H. Diaz B. 5021* (ENCB, MEXU); 5 October 1978, al suroeste de San Francisco, Pichátaro*, G. Caballero 568* (UNAM); 17 October 1963, Quiroga-Morelia road (rt. 15) at km. 346, *B. G. Schubert 211* (MEXU 13058, *M. E. Molina* (MEXU); 30 April 2005, Puerto Garnica, *S. Zamudio 13058, M. E. Molina* (MEXU); 24 September 1994, Zarzamora; 1 km au nor de Zarzamora, *E. Carranza G., J. N. Labat 2512* (MEXU); 30 August 2007, Cerro del Águila subiendo por Tacícuaro*, G. C. Tenorio 2258, E. Sánchez G., G. I. Manriquez, J. Martínez C.* (MEXU); 8 September 1989, 1 km al N de Jeráhuaro, camino a Buenavista, *M. J. Jasso 1543* (MEXU); 9 March 1985, En Mil Cumbres, cerca de la desviación a San Antonio Villalongin, *S. Aureloes 7418* (MEXU); 15 September 1958, Cloud forest area locally called "Cerritos de Agua," ca. 3 miles below the lumber camp at Dos Aguas; nearly west of Aguililla*, R. McVaugh 17847* (MEXU); 7 November 1989, Agua Verde*, E. Pérez C. 848* (MEXU); 13 September 2003, +/- 2 km al N de Ajuno, al N del Cerro La Taza, *M. E. Molina 227, S. Zamudio* (MEXU); 3 October 2001, +- 2 km al E de Tingambato*, E. Carranza 6269, E. Pérez* (MEXU); 11 October 1983, En mil Cumbres a 31 km al SW de Cd. Hidalgo, carretera*, E. Martínez S. 4749, J. C. Soto, G. Silva R., T. P. Ramamoorthy* (MEXU); 7 October 1986, Puerto Garnica*, H. Díaz B. 2782* (ENCB, MEXU); 8 March 1980, a 2 km. al E de San Andrés Corú y a 14 km. al W de Urúapan, *A. Delgado 1135, R. Hernández* (ENCB, MEXU); 23 April 1984, Cerca de Mil Cumbres, por la desviación a San Antonio Villalongin, *G. Silva 6361, R. Reynaga* (MEXU); 14 June 2007, San Miguel Chichimequilas La Mesa, *C. Ledesma C. 364a, A. Torres D.* (MEXU); 28 November 1985, 2 km al S de la entrada a Sn Antonio Villalongin (mirador Mil Cumbres) el cual esta a 33 km al W de Cd. Hidalgo*, R. Torres . 7714B* (MEXU); 24 August 1987, *M. Pérez R. 248* (ENCB); 4 December 1985, *A. Martínez L. 352* (ENCB); 8 December 2010, Mpio. Ziracuarétiro, Malpáis de San Andres Corú, *D. V: Martínez 517* (IEB). **MORELOS:** IX-1903, El Parque, *J. N. Rose 7234* (NY); 10 November 1967, *J. Flores Crespo 223* (CAS, ENCB); 7 November 1966, Near Tres Cumbres in Serranía de Ajusco, *H. D. Ripley 14529, R. C. Barneby* (CAS, NY); 26 May 1898, Serrania de Ajusco*, C. G. Pringle 6861* (CAS, MEXU, TEX-LL); X-1930, Huitzilac*, E. Lyonnet 703* (MEXU, NY, US); 18 November 1907, Tres Marias mTs*, C. G. Pringle 15033* (US); 25 August 1967, 5 km al S de Tres Marias*, G. Salinas 92* (ENCB, IBUG, MEXU); 14 November 1978, 27 Mi. al SW de Tres Marias, "Rancho las Maravillas", *L. Rico 188, V. A. Funk* (MEXU); 15 November 1986, 6 Km al NE de Tepoztlansobre la carr. de cuota a Mexico-CuernavacaMpio. Tepoztlan, *E. Cabrera C. 12288, H. de Cabrera* (MEXU); 7 September 1989, Rancho San Lorenzo Km 53.5 de la carretera federal México-Acapulco (95), al SW del poblado Tres Marías, *I. Diaz B. 1033, R. Noriega* (MEXU13 October 1975, Huitzilac*, M. Sousa 5117* (MEXU); 13 September 1987, *M. Diaz G. 86* (ENCB, MEXU); 15 December 1974, Autopista México-Cuernavaca, bajada a Cuernavaca, *L. Wolfgang B. 3302* (MEXU); 30 November 1967, Cuautla exit from toll road Cuernavaca to Mexico City, *H. S. Gentry 22494* (MEXU); 28 July 1950, 20 km al NW of Cuautla, *W. Fosberg 23* (MEXU); 16 October 1937, Valle del Tepeite*, H. Lyonnet 1789* (ENCB, MEXU); 15 November 1988, *M. Díaz G. 479, A. Díaz* (ENCB); 23 January 1969, *R. Weber 51* (ENCB); 6 November 1955, *L. Paray 1730* (ENCB); 22 September 2010, *M.C: Cruz 350* (ENCB); 1 February1972, *S. B. Dunn 18658, D. Dunn* (ENCB); 25 May 1965. *Rzedowski 19835* (ENCB); 30 July 1967, *J. Flores C. 2380* (ENCB). **NAYARIT:** 19 January 1988, *O. Téllez 11342* (ENCB, IEB, MEXU); 13 September 1989, 50 km al NE de Jesús María, carr. a Huajuquilla, Mpio. Nayar, *P. Tenorio L. 15951, G. Glores F.* (ENCB, IEB, MEXU); 15 September 1994, 1 km al S del km 11 de la carr. Tepic-Miramar o 2 km al SW de Venustiano Carranza, *G. Flores 3785, R. E. González, A. Dominguez* (MEXU). **OAXACA**: 1901, Tres Marias*, J. N. Rose 5314, R. Hay* (NY); 29 December 1936, Cerro de San Felipe, north of Oaxaca*, W. H. Camp 2381* (NY); 29 June 1977, Tierra Azul, a 7 km al NE de Tlaxiaco, Distr. Tlaxiaco*, M. Sousa 7701, O Téllez, A. S. Magallanes, A. Delgado* (CAS, ENCB, MEXU); 21 September 1965, *J. Rzedowski 21068* (CAS, ENCB); 10 December 1865, Sierra de San Felipe*, C. G. Pringle 6264* (CAS, MEXU); 10 November 1966, Mixteca

Alta 13 miles w. of Telixtlahuanca, *H. D. Ripley 14603, R. C. Barneby* (NY); V-1908, Las Naranjas*, C. A. Purpus 3209* (NY); VIII-1907, Collected in the vicinity of San Luis Tultitlanapa, Puebla. Cerro de Gentile, *C. A. Purpus 2681* (NY); 20 September 1894, Foothills on west side of Valley of Oaxaca*, E. W. Nelson 1427* (NY); 8 August 2006, Sola de Vega Llano Borrego, *M. E. Jacob S. (MJS) 276* (IEB, MEXU); 24 October 2006, Sola de Vega Trampa de León rumbo a Río Tenate, *M. E. Jacob S. 860* (MEXU); 15 August 2006, Sola de Vega, Comunidad de Río Humo. Cerca de la Peña, *A. Nava Z. 1595, A. Sánchez, A. Vázquez* (MEXU); 11 September 2006, Sola de Vega. La desviación de Recibimiento, *I. Trujillo O. 431, 469* (MEXU); 19 June 1986, Along Hwy 125 between Teposcolula and Tlaxiaco, 33.5 km S of junction with Hwy 190, 22 km N of Tlaxiaco*, G. Diggs 3868 et al* (MEXU); 13 November 2011, 1.55 km con orientación de 138.45° de la iglesia de San Juan Tlacotenco, *S. B. Munguia 1340* (MEXU); 10 November 1993, Brecha a 2 km al N del Carrizal, entroque de Emiliano Zapara a Cofradia de Chocola, *J. I. Clazada 18930, G. Flores, A. Domínguez* (MEXU); 5 March 1997, 15 km nne along trail to Sta. Catarina Quioquitani. Distrito Miahuatlán, Región Sierra Sur, *E. Hunn OAX 861* (MEXU); 26 November 1998, *A. G. Miranda E, O. L. Hernández* (ENCB, MEXU); 3 November 1986, *P. Tenorio L. 12299, D. Frame* (MEXU); 9 December 1993, *A. Campos V. 5119, R. Torres, L. Cortes* (MEXU); 26 September 1982, a 6 km al S del Punto, en los límites con el Distrito del Centro. Distrito de Ixtlán, *M. Sousa S. 12647* (MEXU); 18 October 1908, *C. Conzatti 2279* (MEXU); 16 July 2004, Tlaxiaco, A 15 km al NE de Tlaxiaco, rumbo a San Juan Teposcolula. Distrito Tlaxiaco, Región Mixteca, *A Delgado s.n.* (MEXU); 24 September 1978, La Cumbre, 13 km SE de Asunción Nochixtlán. Distrito Nochixtlán, Región Mixteca, *M. Sousa 9750* (ENCB, MEXU); 27 September 2002, 6.2 km del entroque para la carretera Villa Tejúpam de la Unión-Coixtlahuaca. Distrito Teposcolula, Región Mixteca*, J. Ismael Calzada 23332* (MEXU); 27 July 2012, *A. Ibarra 256, J. M. Miguel, A. Cruz, Al. Cruz* (MEXU); 4 November 2001, *P. Tenorio L. 21538, L. Kelly* (MEXU); 30 August 1965, 19 kilometers southwest of Sola de Vega along road to Puerto Escondido, *D. E. Breedlove 12301* (ENCB); 8 July 1976, *A. S. Magallanes 123, R. ramos, E. S. Magallanes* (ENCB). **PUEBLA**: VIII-1907, Collected in the vicinity of San Luis Tultitlanapa, Puebla. Cerro de Gentile, *C. A. Purpus s.n.* (NY); 28 September 1984, *P. Tenorio L. 7483, C. Romero de T.* (MEXU).

35.2. ***Astragalus guatemalensis*** Hemsl. var. ***guatemalensis***

Type:—GUATEMALA, Volcan de Fuego, S.E. ascent, 1861, *Salvin & Godman s.n.* (holotype: K000478286 digital image!)
Astragalus guatemalensis Hemsl., Biol. Centr.-Amer. Bot. 1: 266. 1880.

Stems decumbent, reaching up to 1.5 m long; calyx teeth 2.8–3.4 mm long, subulate to triangular; restricted to Chiapas (San Cristobal de las Casas, Huixtán, Zinacantán, Tenejapa) (Fig. 34).

Habitat:—Slopes of mountains; streams; steep slopes; pine-oak forest, associated with *Arbutus*; associations of oak, madrone; 2100–2500 m.

Distribution:—restricted to the state of Chiapas (Fig. 10).

Specimens examined:—**CHIAPAS**: 3 July 1991, Las Ollas, camino San Cristóbal de las Casas- Tenejapa*, L. M. González V. 4004, R. Ramirez D., R. Gonzalez T., R. González A.* (CIIDIR, IBUG); 23 September 1965, Along road 3 miles west of Huistán*, D. E. Breedlove 12420* (NY); 10 November 1985, Cerro de San Felipe, al Sur de San Cristóbal de las Casas, *A. Méndez 8574* (CAS, NY); 10 November 1976, Along road to Chanal 16–20 km east of Chilil, *D. E. Breedlove 41366* (MEXU, NY); 30 November 1982, En el Cerro Huitepec, al O de San Cristóbal de las Casas, *E. Cabrera 3918, H. de Cabrera* (MEXU, NY); 21 September 1972; Near Paraje Navenchauk, *D. E Breedlove 53902* (MEXU, NY, TEX-LL); 21 September 1972, Along small stream 7 km northeast of Huistán along road to Oxchuc and Ocosingo, *D. E Breedlove 27691* (NY); 31 August 1976, Ridge between paraje of Nachih and Zinacantan Center, *D. E. Breedlove 39795* (MEXU, NY); 31 August 1976, Ridge between paraje of Nachih and Zinacantan Center, *D. E. Breedlove 39795* (NY); 8 September 1974, On road to San Lucas Zapotal, 2–4 km from Mexican Highway 190, *D. E. Breedlove 37313* (MEXU, NY); 26 November 1977, 18 km from San Cristóbal de las Casas high above dirt/gravel road that winds through mountains to Tenejapa*, C. H. Ramos s.n., V. A. Funk* (MEXU, NY); 10 November 1985, Cerro de San Felipe, al Sur de San Cristóbal de las Casas, *A. S. Ton 8574* (MEXU, NY); 7 August 1984, a 40 km al W de San Cristobal las Casas, camino a Tuxtla Gutierrez, *E. Martínez S. 6818* (ENCB, IBUG, MEXU); 3 July 1991, Las Ollas, camino San Cristóbal de las Casas- Tenejapa*, L. M. González-Villarreal 4004 R. Ramírez, T. González T., R. González A.* (IBUG, TEX-LL); 7 October 1969, 13 km W of San Cristóbal de las Casas at km 70, *P. Fryxell 1174* (ENCB); 26 October 1965, 1 mile west of Nabenchauk along Mexican Highway 190, *D. Breedlove 13775* (ENCB).

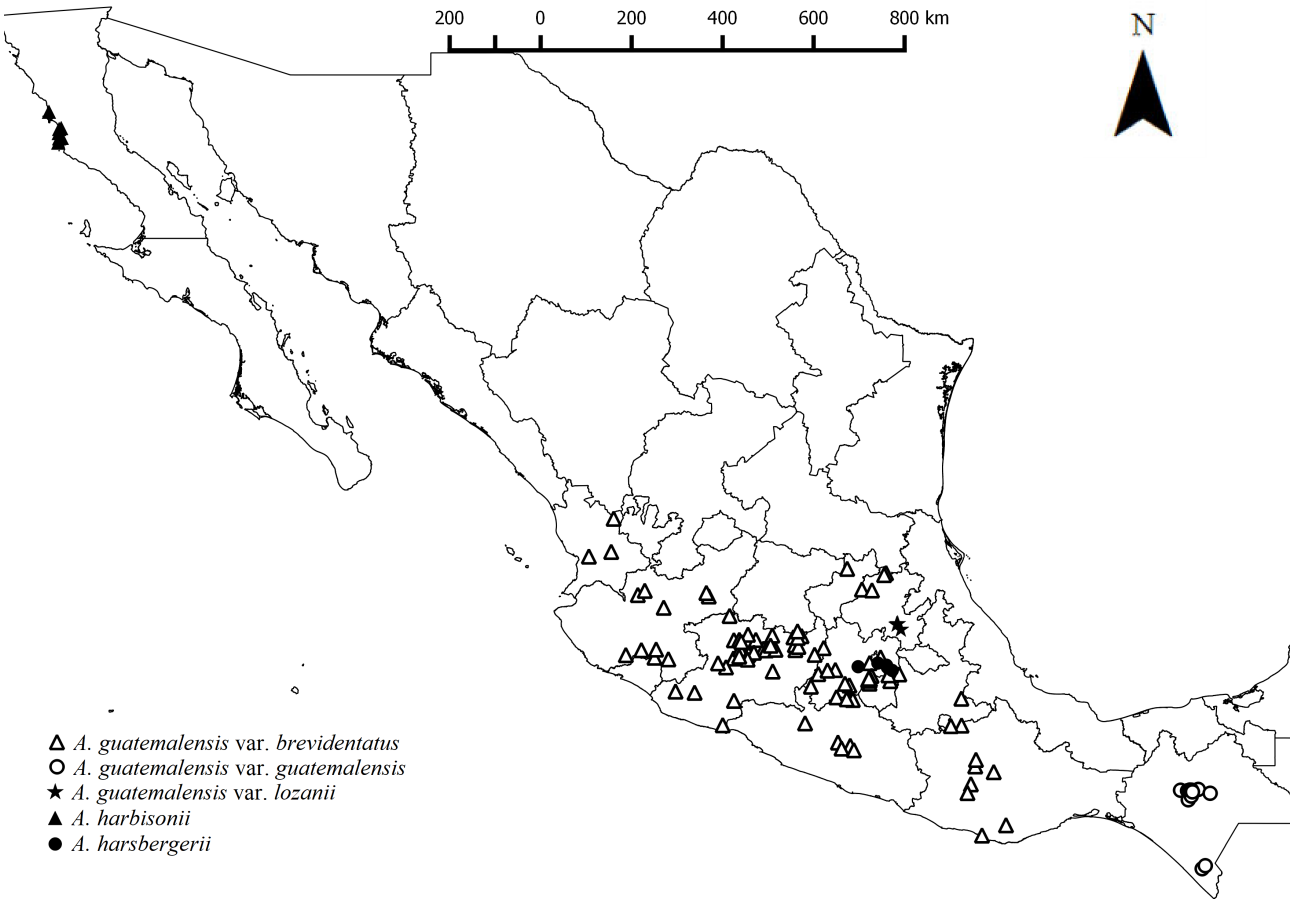

FIGURE 10. Map showing the distribution of *Astragalus guatemalensis* var. *guatemalensis, A. guatemalensis* var. *brevidentatus, A. guatemalensis* var. *lozanii, A. harbisonii,* and *A. harshbergeri* in Mexico.

35.3. *Astragalus guatemalensis* Hemsl. var. ***lozani*** M. E. Jones, Rev. N.-Amer. *Astragalus* 189. Pl. 43. 1929

Type:—MEXICO, Hidalgo, Sierra de Pachuca, 9000 ft. alt., 28 July1898, *Pringle 6935* (holotype: US 00004137 digital image!, US 00997142 digital image!; isotype: NY5798!, CAS0000955 digital image!, MIN1000349 digital image, TEX-LL00371232 digital image!, HBG520400 digital image!, CM0954 digital image!).

Atelophragma lozani (M. E. Jones) Rydb., Bull. Torrey Bot. Club 55: 161. 1928.

Stems 29 cm long or shorter; trichomes short and appressed mixed with longer and straight ones; stipe 3.5–5 mm long. easily discernible from the other two varieties by its short stems and longer stipe.

Distribution:—Endemic from the state of Hidalgo (Sierra de Pachuca) (Fig. 10).

Habitat:—Conifer forest, 2700–2900 m.

Specimens examined:—HIDALGO. 28 July 1898, Sierra de Pachuca. Alt. 9000 ft, *C. G. Pringle 6935* (MEXU, NY, TEX-LL); 21 July 1901, Sierra de Pachuca*, J. N. Rose 5587* (NY, US); 14 June 1975, 1.5 km al WSW de Real del Monte*, Medina, M. 379* (ENCB, IEB, MEXU); 20 May 1973, Piedras Largas, SE de Texoautla, *M. Sousa 4047, J. Rzedowski, M. Peña de S.* (ENCB, MEXU); 3 June 1976, *A. Delgado S.229, R. Hernández* (MEXU); 27 June 1975, *M. Sousa, 4679* (MEXU); 19 June 2003, On hillside next to field, *E. Salgado H. 1, D. Gernandt, D. Téllez M.* (MEXU); 4 March 1963, *Rzedowski 17014* (ENCB); 27 August 1967, *Rzedowski 24286* (ENCB); 4 August 1963, *E, Chávez O. s.n.*(ENCB); 25 June 1967, *A. Trillo B. 30* (ENCB); 17 June 1984, *M. Medina 2547, M. A. Barrios* (ENCB).

36. *Astragalus harbisonii* Barneby, Leafl. W. Bot. 7: 34. 1953

Type:—MEXICO, Baja California, Punta Baja, 6 April 1950, *C. F. Harbison s.n.,* (holotype: not seen; isotype: CAS0000953 digital image!, RSA0002909 digital image!).

Perennial. Stems up to 30 cm long, diffuse o slightly ascending, densely villous, the trichomes up to 0.6 mm long, curly, mixed with longer and straight ones. **Stipules** 3–5 mm long, connate and clasping, the lowest ones, attached to 2 mm of its length, triangular, papery. **Leaves** 5–9 cm long, leaflets 13–23, 2.3–12 mm long, elliptic to orbicular-elliptic, distally acute, rarely rounded. **Peduncles** 2.5–10 cm long, erect o curved; the racemes 1.4–5.9 cm long, flowers 12–23. **Flowers** whitish, sometimes bicolored, the petals (keel) lavender tinted, or the banner pale lavender, darker near center and the keel and the wings purplish-red; the calyx 5.1–6.6 × 2.7–3.2 mm, villous, with white and black mixed trichomes, the tube 3.5–4.2 mm long; the teeth 1.5–2.5 mm long, subulate; the banner 12–12.2 × 6.4–6.7 mm, rhombic to elliptic, briefly retuse distally; the wings 10.8–11.4 × 2.4–3 mm, the claw 4.4–4.8 mm long, the blade 7.5–7.9 mm long, oblong; the keel 9.2–9.9 × 2.5–2.7 mm, the claw 4.4–5 mm long, the blade 5.1–5.6 mm long, distally maculated. **Pod** 1.5–2 × 0.8–1.1 cm, sessile, ascending, elliptic, inflated, bladder-like, basally rounded or obtuse, distally contracted in a triangular beak, sutures very narrow, ventrally straight to scantily convex, dorsally convex, the valves thin, strigose, papery, membranous, ochre, something translucent, softly reticulate, septum absent; ovules 22–27; seeds 2.5 mm long, mitt-shaped, brown, sub-opaque.

Distribution:—Endemic to northwestern of Mexico. Distributed in a small area along the western coast of central Baja California (29°–57'N–30°18'N), from Nueva Odisea, El Socorrito, Valle Tranquilo to Punta Baja) (Fig. 10).

Habitat:—Coastal dunes; coastal cliffs; sandy soils; marine terraces; common in dune slacks and low beach dunes; arroyo bank; back edge of dunes; scrubland areas, 0.3–5 km away from the coasts; 5–25 m.

Comments:—Sometimes forming dense mats about 3.5 m wide. In the areas where this species is found, at least other four species of *Astragalus* (*A. anemophilus, A. hornii, A. insularis* and *A. magdalenae*) can co-occur in the coastal dunes and adjacent areas, but only *A. harbisonii* and *A. anemophilus* have connate stipules, but *A. anemophilus* has longer (2.5–4 cm) pods.

Specimens examined:—**BAJA CALIFORNIA**: 1 June 1994, On coastal flats to the west of Mex. Rte. 1 between San Quintin and El Rosario; approx. 9 miles north of El Rosario, *J. P. Rebman 2764* (BCMEX, MEXU); 25 March 1985, Coastal bluffs, 15½ mi. north of El Rosario and ¼ mi. west of Hwy 1 at a prominent sand dune, *A. C. Sanders 5432, E. Rodríguez, J. West et al.* (NY, TEX-LL); 19 April 1975, South side of Punta Baja near the tip, *R. Moran 21769* (CAS, ENCB, NY, TEX-LL, US); 5 July 1980, Bocana El Rosario, *R. Moran 28964* (NY, SD, TEX-LL); 28 February1985, From El Rosario to Punta Baja, *D. E Breedlove 62217* (CAS); 24 February1991, Near Punta Baja, *D. E. Breedlove 71572* (CAS); 14 June 1976, La Bocana de El Rosario, *R. Moran 23531* (CAS, NY, SD); 17 June 1980, Punta Baja, a small peninsula extending into the ocean from El Rosario, *P. A. Bowler s.n.* (NY); 26 March 1973, La Bocana; El Rosario, *A. Johnson 137, 138* (SD).

37. *Astragalus harshbergeri* (Rydb.) A. E. Estrada, Villarreal & A. Delgado. Phytotaxa 470(2): 127–130

Astragalus radicans Hornem. var. *harshbergeri* Barneby, Mem. New York Botanical Garden 13: 165. 1964.

Basionym: *Atelophragma harshbergeri* Rydb. Bull. Torr. Club 55: 160. 1928.

TYPE:—MEXICO. Mexico City, Salazar, Sierra de Las Cruces, alt. 11000 ft. 13 Aug 1896, *J. W. Harshberger 20* (holotype: GH!; isotypes: PH00005764 digital image!; PH00005765 digital image!; US 00004129 digital image!).

Plant perennial. **Stems** up to 80 cm long, and 30 cm tall, prostrate, creeping, commonly rooting at the nodes, the trichomes up to 0.6 mm long, appressed. **Stipules** 3–5.5 mm long, elliptic, obovate to almost orbicular, connate, attached half of its length or little more, much wider than stems. **Leaves** up to 10 cm long, leaflets 17–26, 4–12 mm long, lanceolate, oblong, elliptic, obtuse, truncate and apiculate, adaxially glabrate or sparsely so, abaxially strigose. **Peduncles** 2–7 cm long, erect, perpendicular to foliage growth, trichomes black; the racemes short, 1–2.5 cm long, flowers 5–12. **Flower bracts** oblong to ovate-oblong, 2–5 × 1–1.5 mm long. **Flowers** yellow, cream, yellowish to ochrolecous; the calyx 5.5–8.9 × 2.7–3.6 mm, strigose, trichomes mainly black, the tube 3–6 mm long, campanulate, the teeth 2–3.5 mm long, lanceolate, ventral pair wider; the banner 11.5–13 (very rarely up to 15 mm) × 4–6 mm, elliptic, oblong to oblanceolate, shallowly notched, the wings 11–12 × 2–2.5 mm, the claw 5–6.5 mm long, the blade 5.5–7.3 mm long, narrowly oblong oblique, elliptic; the keel 8–10 × 2.1–3 mm, the claw 4–4.5 mm long, the

blade 4–6 mm long, distally oblique; androecium diadelphous, stamens 10, 8.5–9 mm long, anthers yellow, 0.5 mm long; gynoecium 9 mm long, ovary 4.5 mm long, oblong, glabrate, style linear, 4.5–5 mm long, stigma minute. **Pod** deflexed, subsessile or very shortly stipitate (stipe 0.4–1 mm long), oblong to elliptic, 15–21 × 5–8.2 mm, somewhat dorsoventrally compressed, basally rounded or narrowed, distally abruptly apiculate, ventrally carinate, dorsally open and shallowly sulcate, the valves rigid, papery, strigose, trichomes black or rarely also with trichomes white or mixed, septum incomplete; ovules 14–24; seeds 1.8–2.6 mm long, mitten shaped, pale-brown to brown, opaque.

Distribution:—Restricted to the state of Mexico and Mexico City in high altitudes, 2600–3300 m. Salazar, Sierra de Las Cruces, adjacent to Cerro El Ajusco, in close proximity to Naucalpan (Villa Alpina), Ixtapaluca, Llano Pinahua, 10 km al S del Llano Grande (Fig. 10).

Habitat:—Rare; cold pine forest; conifer forest; 2600–3300 m.

Comments:—One of two species in Mexico that roots at its flowering nodes.

Additional specimens examined: MEXICO CITY: Delegación Ixtapalapa, 2 km al E de Ixtapalapa, cerca de la estación XEW, *Rzedowski 20088* (ENCB). **STATE OF MEXICO**: not locality, *L. W. Boege 290* (MEXU); near Río Frío at Llano Grande, *A. J. Sharp 4485* (MEXU); Ixtapaluca, Estación Experimental Forestal de Zoquiapan, *M. C. Obieta 40* (MEXU); Municipio Ixtapaluca, Estación Experimental de Investigación y Enseñanza de Zoquiapan, 8 km al sur de Río Frío, casi 200 m al N de Aculco, sobre camino seis, , *R. Vega A. 196* (ENCB); Municipio Ixtapaluca, Llano Pinahua, 10 km al sur de Llano Grande, *Rzedowski 36796* (IEB, MEXU); Llanos de Salazar, *F. Medellin, G.C. Rzedowski s.n.*(ENCB); Municipio Lerma, Parque Nacional Miguel Hidalgo y Costilla (La Marquesa), llanos, camino a Chalma, *Sánchez-León 66* (ENCB); Municipio Ixtapaluca, Estación Experimental y de Investigación y Enseñanza de Zoquiapan, 8 km al sur de Río Frío, Llano Xaxalpa, orilla de camino 5, pie del Cerro El Papayo, *R. Vega A. 381* (ENCB); Municipio Tlalmanalco, Llano Atlihuiyán, 10 km al E de San Rafael, *Rzedowski 37875* (IEB); Municipio Chalco, 1 km al N. de Llano Grande, en las faldas del el Cerro El Telapón, *Rzedowski 18438* (ENCB); Municipio Zoquiapan, Llano Grande, cerca de Río Frío, *R. Cruz C. 1268* (ENCB); Municipio Ixtapaluca, Llano Tepochaico, 10 km al sur de Río Grande, *Rzedowski 36807* (ENCB); Municipio Naucalpan, Villa Alpina, *Rzedowski 36323* (ENCB).

38. ***Astragalus hartmanii*** Rydb., in N. Amer. Fl. 24: 442. 1929

Type:—MEXICO, Chihuahua, Near San Diego ranch, alt. 6000 ft., 2 May 1891, *Hartman 678* (holotype: NY00005800!, isotype: PH00005434 digital image!, GH00059416, GH00059417 digital images!, US00004128 digital image!,

Perennial. Stems up to 48 cm long, strong, soflty pilose, trichomes up to 5 mm long, curly, straight and ascending, turning tan or ochre or with rust tones with age. **Stipules** 7–20 mm long, free, lanceolate to deltoid. **Leaves** 7–25 cm long; leaflets 21–29, 8–58 mm long, elliptic, ovate, rhombic to oblanceolate, acute to obtuse, thin texture, glabrate or almost so adaxially. **Peduncles** 12–25 cm long, hard, striate; the racemes up to 10.8 cm long, flowers 15–25 narrow, long and ascending. **Flowers** yellow to yellow-lemon; the calyx 28–30 × 6–7 mm, softly pilose, the tube 16–17 mm long, cylindrical, distally constricted; the teeth 11–12 mm long, linear to lanceolate; the banner 32–37 × 11 mm, oblanceolate, obcordate or almost so; the wings 31–34 × 3.3 mm, the claw 20–22 mm long, the blade 13–14 mm long, narrow oblanceolates; the keel 30–32 × 3.9–4.3 mm, the claw, 19–22 mm long, the blade 11–14 mm long, semi-obovate, incurved. **Pod** 15–35 x 12–20 mm, sessile, humistrate with age, ovoid to oblong, inflated bladder-like, dorsoventrally compressed, laterally rounded, the lateral faces rounded, basally rounded, and distally contracted in a short triangular beak, shallowly sulcate dorsally, the valves green, 1 mm wide when fresh**, turning rigid and leathery, internally pubescent, ochre, smoothly reticulate and wrinkled, black and stiff-papery, septum complete, at least below the peak, thence the pod bilocular; ovules 40–46; seeds 2.7–2.8 mm long, brown-black, mitt-shaped, smooth.

Distribution:—Endemic to northwest Mexico. Only in in the state of Chihuahua (Colonia Juárez, Ignacio Zaragoza, El Huili, Valle Grande, San José de Los Pozos, Pacheco, El Gavilán) (Fig. 11).

Habitat:—Flood plains; abundant in tickets along the riverside, associated with riparian disturbed vegetation; associated with poplar, sycamore, ash tree, walnut, willow; also in oak-pine-sumac forest; 1560–1880 m.

Comments:—From the approximately 10 species distributed in those areas, at least three of them can be separated by their yellow petals, *A. giganteus, A. hartmanii* and *A. longissimus*, however, only the first two species have sessile and inflated pods. *Astragalus giganteus* has semi-clasping stipules, the racemes up to 20 cm long with 15–65 flowers, the calyx 7.5–14.7 mm long, smaller petals (banner 1.4–2.5 cm long, wings 1.2–1.9 cm long, the keel 1.1–1.5 cm long), and shorter, non-humistrate pods 1.5–2.5 cm long. *(Spellenerg, 1988).

Specimens examined:—CHIHUAHUA: 8 June 1987, On the flood plain of the Rio Piedras Verdes 5 km NW of Colonia Juarez, ca. 20 air km SW of Casas Grandes, *R. Spellenberg 9163* (MEXU, NY); 9 June 1987, Ca. 60 air km SW of Casas Grandes, on the flood plain at the crossing of the Rio Piedras Verdes and on steep wooded 50% 5 km SE of El Huili, *R. Spellenberg 9178* (ENCB, MEXU, NY); 5 April 1997, Juarez River (Piedras Verdes) 0.5 mi. w. of Juarez, *N. D. Atwood 21625, 21630* (NY); 2 May 1891, Near St. [San] Diego ranch. AAlt. 6000 ft., *C. V. Hartman 678* (NY).

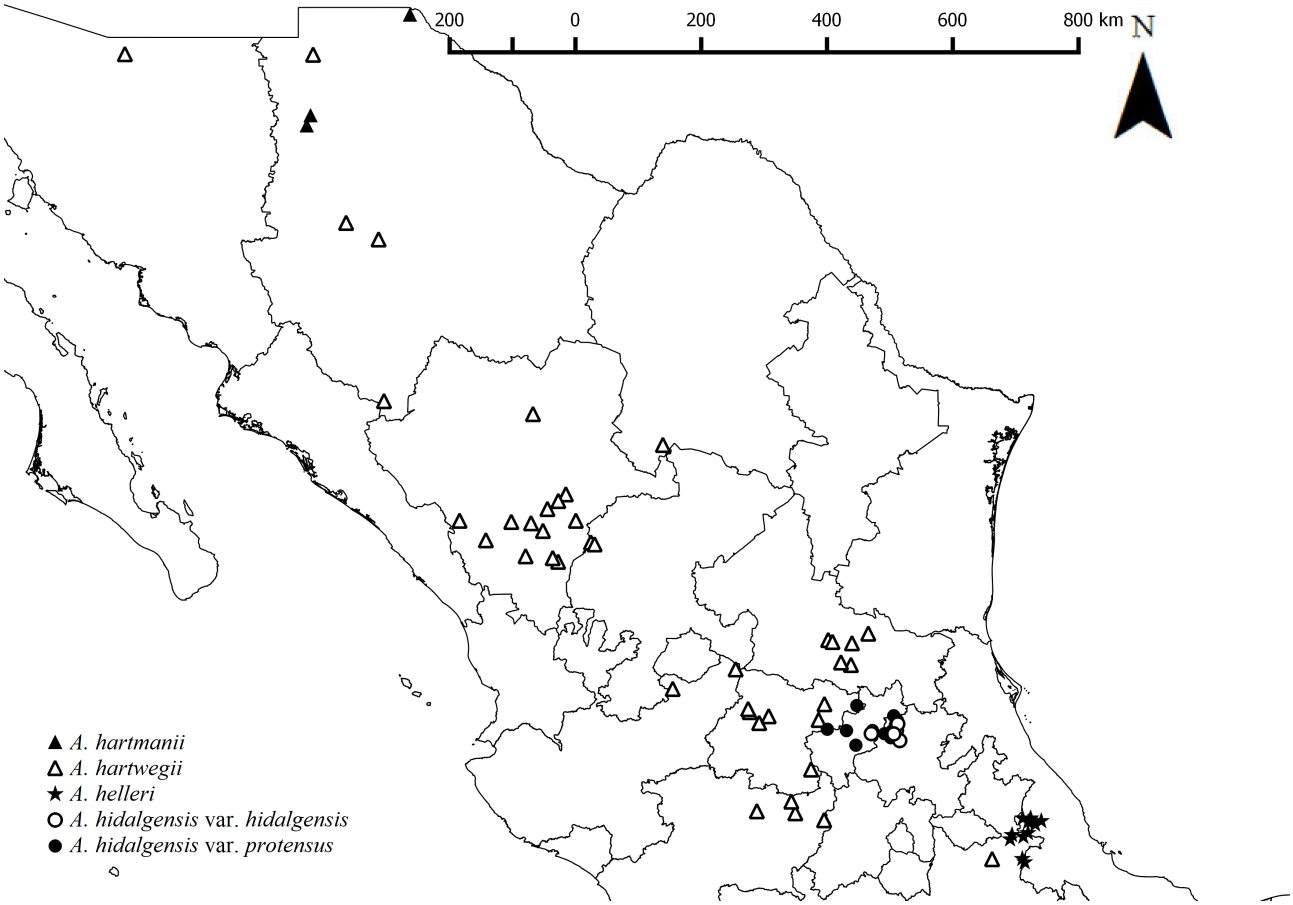

FIGURE 11. Map showing the distribution of *Astragalus hartmanii, A. hartwegii, A. helleri, A. hidalgensis* var. *hidalgensis,* and *A. hidalgensis* var. *protensus* in Mexico.

39. *Astragalus hartwegii* Benth., Pl. Hartw. 10. 1839

Type:—MEXICO, Aguascalientes, 1839, *Hartweg 53* (holotype: K000478283 digital image!; isotype: P00585370 digital image!, E00383728 digital image!, LD1001510 digital image!

Hamosa hartwegii (Benth.) Rydb., Bull. Torrey Bot. Club 54: 333. 1927.—*Tragacantha hartwegii* (Benth.) Kuntze, Revis. Gen. Pl. 2: 945. 1891.

Hamosa hidalgensis Rydb, Bull. Torrey Bot. Club 54: 333. 1927.

Perennial. Stems up to 40 cm long, suberect, semi-prostrate, widely diffuse, minute strigose, trichomes up to 0.5 mm long, appressed or subappressed. **Stipules** 1–4 mm long, the lowest clasping, free, the rest semi-clasping, not connate, triangular, triangular-lanceolate to lanceolate. **Leaves** 2–15 cm long, leaflets 15–29, 3–21 mm long, linear, oblong, elliptic, obtuse or acute, rarely obovate and retuse, glabrate o softly pubescent adaxially. **Peduncles** 4–21 cm long, ascendant, straight or curved; largest racemes 4–15.5 cm long, dense when young, turning lax with age, flowers 15–62, soon deflexed. **Flowers** purple, at least the banner, turning pale-blue when dry or white to white-greenish; the calyx 3.2–4.8 × 1.7–2.5 mm, strigose, trichomes white or black, the tube 2.2–3.4 mm long, campanulate, basally inequilateorus, truncate, inequilateral at the base; the teeth 1–1.4 mm long, subulate to triangular; the banner 7–9.2 × 3.5–5.4 mm, ovate, narrow basally; wings 6.6–8.6 × 1.2–1.7 mm, the claw 2.5–3.2 mm long, the blade 4.5–6.3 mm

long, incurved, lanceolate, distally obtuse; the keel 5.2–6.3 × 1.9–2.2 mm, the claw 2.5–3 mm long, the blade 3.1–4.3 mm long, semi-obovate. **Pod** 1–1.5 × 0.2–0.24 cm, sessile, deflexed, lanceolate, linear to oblong, straight o strongly incurved, triquetrous, basally rounded, distally narrow in a subulate beak, laterally compressed, ventrally carinate, dorsally widely sulcate, lateral faces straight to slightly rounded, the valves soft strigose, papery, ochre or turning black with age, soflty reticulate, septum complete, thence the pod bilocular; ovules 14–19; seeds 1.2–1.5 mm long, mitt-shaped, smooth, brown, green-olive, sometimes with purple spots.

Distribution:—Endemic to Mexico. From central (Cuauhtémoc, Guerrero, Carretas, Colonia Diaz), and northeastern (Nazareno, Chocolate and Zaragoza) mountains of Chihuahua, through central-eastern (Guadalupe Victoria, Carlos Real, Morcillo, Durango, Nombre de Dios and Amado Nervo) and southern (Suchil, Mezquital, Temoaya, Baluarte, Ollitas, Amoles y Los Charco) Durango, southern Coahuila (Parras), western (Sombrerete y Chalchihuites) Zatacecas, in close proximity to Durango, northwestern (Charcas) and central (Ciudad del Maíz, Río Verde) San Luis Potosí, southern Aguascalientes to central-eastern Guanajuato (Fig. 11).

Habitat:—Alluvial, yellow, white, clayey, deep, and stony soil; basalt; rocky slopes; river banks; plains with grasslands; open pastures along moist draw; halophytic grasslands; halophytic grasslands with masquite and grasses; dry grasslands; juniper-grassland; acacia-prickle pear associations; conifer forest, oak-pine forest; oak forest; stream banks; sometimes as weed in cultivated areas; arid xerophytic scrublands; riparian vegetation with pine douglas fir, oak, cypresss; 1000–2700 m.

Comments:—A sympatric and morphologically similar species to *A. vaccarum*, but it has a symmetrical calyx at the base and a shorter pod (6–12 mm long). In herbarium samples, *A. hartwegii* is frequently confused with *A. ervoides*. It is possible to recognize and distinguish them based on the attachment of the pod to the receptacle. In *A. ervoides* the pod is elevated from the receptacle by a stipe (0.5–1.5 mm long), even when small (0.5 mm long), the stipe is always present, but also can be discerned by inflorescences size, because, the peduncles (3–9 cm long) and the racemes (up to 4 cm long) of *A. ervoides* are shorter. When the plant is flowering and lacking fruits, *A. hartwegii* and *A. micranthus* are physiognomically very similar, but the most obvious characteristics to distinguish them are the stipules; *A. micranthus* has connate ones (at least the basal ones). When fruiting, the pods of *A. micranthus* are persistent on the receptacle until dehiscence, they have also thinner texture, almost straight or less curved, and more trigonous than triquetrous, the compression is less pronounced, with more rounded lateral faces, and proportionally fewer ovules, 8–14.

Specimens examined:—CHIHUAHUA: 29 July 1985, Los Arcos (Aprox. 11 Km. de La Guajolota), *I. Solís 74* (CIIDIR, MEXU); 20–21 September 1899, At Colonia Diaz, *E. W. Nelson 6448* (NY); 3 August 1959, 12 miles W of Cuauhtemoc, 78 miles W of Chihuahua, *F. W. Gould 8733* (JEPS); 9 September 1887, River bluffs, Guerrero, *E. Palmer 1217* (NY); 9 September 1887, River bluffs, Guerrero, *C. G. Pringle 1217* (NY, US); 27 August 1887, River bluffs, Guerrero, *C. G. Pringle 1217* (NY). **COAHUILA:** 1/10-1880, San Lorenzo de Laguna and vicinity22 to 27 leagues southwest from Parras, *E. Palmer 235* (US). **DURANGO:** 13 July 1990, 56 km al sur por el camino a La Flor, Mpio 005, *A. García 4458, S. González* (CIIDIR); 16 July 1981, Villa Unión, 3.5 km al N de La Cieneguilla, *S. González 1732* (ANSM, CIIDIR, IEB, MEXU, NY); 13 July 1990, 56 km al S, por el camino a La Flor, *A. García 4458, S. González, R. Spellenberg* (ANSM, CIIDIR, ENCB, IBUG, IEB, MEXU); 22 August 1995, Reserva de La Michiliam Ciénega de Los Caballos, Mpio. Súchil, *J. A. Villarreal 8208, M. A. Carranza, A. García A.* (ANSM, CIIDIR, IEB, TEX-LL); 26 July 1982, Along hwy. Mex. 40, 3 km. SW of turnoff to Carlos Real, 32 km, *G. Diggs 3040, M. Nee* (MEXU, NY); 25 July 1958, 19 miles northeast of Durango, route #31, *D. S. Correll 20167, I. M. Johnston* (NY, MEXU, SD, TEX-LL); 7 September 1989, Mesa de Canalitas, *A. A. Paredes 839* (MEXU); 24 July 1990, Ca. 47 air km SSW of Vicente Guerrero on road to Las Margaritas, 6 rd km on main road S of the headquarters area called "Piedra Herrada of the Reserva de la Biosfera "La Michilia", at km. marker 60, *R. Spellenberg 10311, S. González* (MEXU, NY); 25 July 5 August 1906, Otinapa, *E. Palmer 395* (NY); IV November 1898, Collected at the city of Durango and vicinity, *E. Palmer 290* (NY); 19 August 1959, 10 miles south-east of Durango, *U. T. Waterfall 15520* (NY); 30 June 1984, 2 Km al W de Lechería, carr. a La Ciudad, *P. Tenorio 6059, T. P. Ramomoorthy* (MEXU, NY); 30 July 1990, Km. 3 de la carretera Santiago, *A. Benítez P. 1803* (IEB, MEXU); **GUANAJUATO:** 4 August 1989, Guanajuato, *E. Ventura 6978, E. López* (ENCB, IEB, MEXU); 26 October 1972, On the highway between Guanajuato and Dolores Hidalgo, 13.5 mi. w of Dolores Hidalgo, *R. Spellenberg 2970* (NY) 28 June 1982, El Madroño 64 km, al NW de Durango, *P. Tenorio L. 682,C. Romero de T., R. Hernández* (MEXU); 30 July 1991, Guanajuato, *E. Ventura 9355, E. T. López* (IEB, MEXU); 28 August 1994, 12 km al SW de Nuevo Valle de Moreno, Mpio. León, *Rzedowski 52386* (IEB); 24 September 1994, Sobre la carretera a San José, *Rzedowski 52637* (IEB, MEXU); 2 August 1990, 10 Km de Canelas, camno a Cuevecillas, *A. Benitez 1763* (MEXU); 7 September 1989, Mesa de Canalitas, *A. Benitez P. 839* (MEXU); 30 April 1998, La Mesa de los Hernández. Poblado de la Mesa, *J. Martínez C. 973* (MEXU); 28 August 1997, la Mesa de los Hernández, *M. Cano M. 65* (MEXU); 24 September 1994, Sobre la carretera a San

José, *Rzedowski 52637* (IEB, MEXU). **JALISCO:** 2 August 1987, *R. Ornelas U. 896* (IBUG); 3 August 1999, Papas de Arriba, aprox. 4.5 km al NO de Guadalupe Victoria, Mpio. Ojuelos de Jalisco, *P. Carrillo R., M. Harker 836* (IEB); 2 August 1987, 3 km. en la Desv. hacia el Novillo carret. a Lagos de Moreno a Ojuelos en campos de cultivo de maíz, *M. L. Román M. 835* (MEXU); 24 September 1994; 7 September 1973, La Calera, 11 km al N de Teocaltiche, Mpio. Teocaltiche, *L. M. Villarreal 5192* (ENCB). **MICHOACÁN:** 31 July 1992, Cerro La Cinsinillas, *J. M. Escobedo 2381* (ENCB, IEB, MEXU); 5 July 1986, aprox. 2 km al NO de La Concepción, Mpio. Morelia, *V. M. Huerta 557* (IEB); 15 June 1986, Puerto de Los Tepetates, arox. 1 km al SE de Huajumbaro, Mpio. Cd. Hidalgo, *S. Zamudio R. 3915* (IEB); 5 August 2000, Estación Chincua, Reserva de la Biósfera Mariposa Monarca, (alrededores del vivero forestal), *M. G. Cornejo T. 33* (IEB, MEXU); 30 July 1984, aprox. 1 km al S de Francsico Villa, Mpio. Zinapécuaro, *M. Díaz J. 209* (IEB); **PUEBLA:** 12 August 1987, Camino lado sur Santiago Xalitzintla, Mpiop. Cholula, *F. Ramos N. 2657* (IEB). **SAN LUIS POTOSÍ:** 16 September 1967, 9 km al E of Rioverde, sobre la carretera a Rayón, *J. Rzedowski 24780, M. E. Sánchez, R. Cruz* (ENCB, NY); 31 May 1971, Just off Mex. 70, 0.4 mi. e. of e. edge of Rio Verde, *D. B. Ward 7795* (NY); 10 September 1960, Ciudad del Maíz, ± 4 km al SW de Tablas, *F. Takaki* 448 (ENCB, NY); 12 September 1960, Rioverde, De San Bartolo a Progreso, *F. Takaki 378* (NY); 23 June 1962, La Gavia, *A. Gómez 697* (NY); V September 1911, Minas de San Rafael, *C. A. Purpus 5195* (NY); 2 June 1904/ 8 June 194, Media Luna, near Rio Verde, *E. Palmer 81* (NY); 14 May 1955, San Bartolo, cerca de la Laguneta, Mpio. Río Verde, *Rzedowski 5818* (ENCB). **SONORA:** n.d., Los Nogales, *E. K. Smith s.n.* (NY). **ZACATECAS:** 8 August 1971, Along Mexico Highway 49 below San Francisco los Flores, a small village south of the highway about 8.5 miles northwest of Sombrerete, the road to San Francisco being opposite that to Providencia, about 1 mile south of Highway 49, *J. L. Reveal 2672, W. J. Hees, W. Kiger* (NY, US); 16 October 1965, S. end of Sierra de Papanton east of El Calabazal, *H. D. Ripley 14154, R. C. Barneby* (MEXU, NY, US).

40. *Astragalus helleri* Fenzl, Bonplandia 8: 56. 1860

Type:—MEXICO, Veracruz, Am trachytischen Sandbogen am Westabhange der Cordillera des Orizaba zwischen 9–10,000 uber d. M., unweit des Rancho Canoitas auf dem selten betretenen Gebirgspass, welcher von Capilla nach Achilchotla fuhrt, 1846, *Heller 236* (holotype: not seen).

Tragacantha helleri Kuntze, Revis. Gen. Pl. 2: 945. 1891.

Astragalus orthanthus A. Gray, Proc. Amer. Acad. Arts 6: 195. 1864.—*Tragacantha orthantha* Kuntze, Revis. Gen. Pl. 2: 947. 1891.

Astragalus erythrostachys Ulbr., Notizbl. Königl. Bot. Gart. Berlin 3: 192. 1902.

Perennial. Stems up to 40 cm long, a lot, crenfted, rarely few or single, basally ascending and hard, whitish-tomentose when young, turning rusty with age, trichomes up to 1.3 mm long, two types, short and long mixed. **Stipules** 3–10 mm long, semi-clasping, triangular to lanceolate, not connate. **Leaves** 8–25 cm long, leaflets 19–35, 4–13 mm long, ovate to obovate, obtuse or acute. **Peduncles** up to 16 cm long, hard, erect or incurved; the racemes 3.5–7 cm long, flowers 10–20. **Flowers** red; the calyx 1.2–1.8 × 0.4–0.5 cm, densely pubescent, the tube 0.8–1.4 cm long, cylindrical, reddish, the teeth lanceolate, 2.4–6 mm long; banner 2.4–3.3 × 0.6–0.8 cm, oblanceolate; the wings 2.2–2.9 × 0.1–0.3 cm, oblanceolate, the claw 1–1.4 cm long, the blade 1.1–1.2 cm long; the keel 2.2–2.7 × 0.2–0.3 cm, the claw 1.3–1.8 cm, the blade 0.9–1.1 cm long. **Pod** 2.5–5 × 1 cm, sessile, oblong to elliptic, basally rounded o narrow-rounded, distally contracted in a short beak, somewhat compressed, dorsally sulcate, the valves slightly fleshy to strongly stiffly papery, ochre, reticulate, densely tomentose, sometimes with *pink tones, septum complete, the pod thence bilocular; ovules 28–36; seeds 2–2.3 mm long, subquadrangulate to mitt-shaped, dark-brown to blackish, smooth, opaque. **F. Ventura 2425* (NY).

Distribution:—Endemic to south of Mexico; mountains around the Cofre de Perote volcano in Central Veracruz (Frijol Colorado, Mastaloyán, Perote, Justo Sierra, Altotonga) in close proximity to Puebla (Cerro de los Derrumbaderos, San Manuel de la Sierra). Sometimes abundant (Fig. 11).

Habitat:—Step hills, gravelly, volcanic, clayey, sandy, stony, yellow soils; associated to conifer forest; pine-oak forest; pine-juniper forest; pine with tussock grassland; blue grama grasslands; beargrass; secondary vegetation; stream banks; 2300–3170 m.

Comments:—The three species of *Astragalus* with red flowers in Mexico are distantly distributed from each other, *A. coccineus* in Baja California, and *A. sanguineus* in northeastern Mexico.

Specimens examined:—PUEBLA: 28 February1981, Oriental, Portes Gil. ± 5 km. al NE de Zacatepec, carr. a Veracruz. Izotal de Nolina, *C. Muñoz B. 20* (ENCB, MEXU, NY); 7 May 1938, San Manuel de la Sierra, Sierra Negra,

E. K. Balls 4462 (NY); 14 March 1973, Cerro de los Derumbados 3 miles NE of Zacatepec Volcanic sand and tuff, *H. S. Gentry 23389* (MEXU, US); 13 July 1953, Cerca de Zacatepec, *D. Gold 298* (MEXU30 March 1984, Carretera a González Ortega 5 km después Progreso, *D. Robledo M. 135* (MEXU); **VERACRUZ:** 7 August 1971, Justo Sierra, *F. Ventura A. 4015* (ENCB, NY, SD); 26 July 1986, Perote, 3 kms despues de Frijol Colorado hacia Mastaloyan, *M. de J. Cházaro Bazañez 3770* (MEXU, NY); 25 July 1986, Perote, Cerca de Guadalupe Victoria rumbo a Los Altos, *M. de J. Cházaro Bazañez 3732* (MEXU, NY); 21 April 1976, Alrededores de Perote*, S. Avendaño R. 203* (MEXU, NY); 28 June 1977, Carretera Perote al Cofre, Perote, *J. J. Fay 702, C. Hernández* (MEXU, NY, US); IX-1928, Slopes of Cerro de Perote, Perote*, C. A. Purpus 11108* (NY); 30 November 1981, Altotonga, 5 km. W of Orilla del Monte, 15 km. (by air) NW of town of Perote, *M. H. Nee 23500* (MEXU, NY); 4 June 2015, Perote, *P. Carrillo-Reyes, V. Sosa, C. J. Vázquez-Cotero 7830* (IBUG, IEB, MEXU); 4 June 1981, a 4 km del pobaldo guadalupe victoria carretera para vaquería, *J. I. Calzada 7404* (ENCB, IBUG, IEB, MEXU); 25 June 1986, Cerca de Guadalupe Victoria rumbo a Los Altos, *M. Cházaro, R. Acosta 3732* (MEXU).

41. ***Astragalus hidalgensis*** (Rydb.) Barneby, Mem. New York Bot. Gard. 13(1): 175. 1964

Atelophragma hidalgense Rydb., Bull. Torrey Bot. Club 55: 159. 1928.

Astragalus strigulosus var. *gracilis* Hemsl., Biol. Centr.-Amer., Bot. 1: 266. 1880.

Perennial. Stems up to 70 cm long, decumbent or slightly ascending, strigose, the trichomes up to 0.4 mm long. **Stipules** 0.7–5 mm long, connate at least the lowest ones, bidentate, the upper ones amplexicual. **Leaves** 1–6 cm long, leaflets 13–23 ovate, 2–12 mm long, oblong to obovate, distally truncate or retuse, occasionally mucronate, bicolored or brighter and glabrate adaxially. **Peduncles** 3.5–9.5 cm long, thin, erect to incurved; the racemes 1.5–12 cm long, lax, flowers 5–17, soon pendulous. **Flowers** white, lilac, yellow, bluish or purple with lilac tones, rarely blue; the calyx 3.4–4.5 × 1.9–2.3 mm, strigose, trichomes black or white and black mixed, the tube campanulate, 2.3–2.7 mm long, the teeth subulate, 0.9–1.8 mm long; the banner 6.7–8 × 4–4.8 mm, obovate to oblanceolate, shallowly or evidently retuse; the wings 6.4–6.9 × 1.7 mm, the claw 2–2.6 mm long, the blade 5–5.6 mm long, oblanceolate, truncate o briefly emarginate; the keel 4.8–5.6 × 1.7–1.9 mm, the claw 2.3–2.5 mm long, the blade 3–3.3 mm long, semi-obovate, strongly incurved. **Pod** 1.2–2.3 x 0.4–0.5 cm, pendulous, stipitate (the stipe 0.5–1.2 mm long) oblong, elliptic to obovate, straight o slightly curved, narrowed at both ends, dorsoventrally compressed or triquetrous, narrow and strongly flattened laterally, ventrally carinate, dorsally shallowly and widely sulcate, the valves hard papery, minute pulverulent when young, glabrate with age, brown, smoothly reticulate, septum complete, the pod two-celled; ovules 9–18; seeds 2.5–2.7 mm long, rounded, mitten shape, brown to light-brown, smooth, somewhat shiny.

Distribution:—Endemic to south of Mexico. Mountains of Hidalgo (La Misión, Pacula, Jacala de Ledezma, Encarnación, El Sabino and north of Zimapán), and areas adjacent to the geopolitical border with Querétaro.

Comments:—From the eight *Astragalus* species distributed in this region only *A. hidalgensis* and *A. strigulosus* has oblong, elliptic to obovate (non inflated bladder-like), tumescent (bulged) and stipitate pods. Both species can be recognized based on the leaf size, leaflets number and petal size. *A. strigulosus* has longer leaves (4–10 cm long), longer leaflets (in average 18 mm long), more flowers per raceme (12–40) and longer petals (banner 9.2–11.5 mm, wings 7.7–10.5 mm, keel 6.7–7.5 mm).

Two varieties are recognized based on raceme and pod size. Both varieties are sympatric, and, inhabit the same habitat.

1. Peduncles 3–5 cm long, as long as the leaves; racemes 1–3 cm long in fruit; pod 1.3–1.4 × 0.5 cm; pod always flattened; Hidalgo and Querétaro ..... **var. *hidalgensis***
- Peduncles 6–9.5 cm long, much longer than leaves; racemes 5–12 cm long in fruit; pod 1.2–2.3 × 0.4–0.5 cm; pod flattened, rarely triquetrous; Guanajuato, Hidalgo and Querétaro..... **var. *protensus***

41.1. ***Astragalus hidalgensis*** (Rydb.) Barneby **var. *hidalgensis***

Type:—MEXICO, Hidalgo, Sierra de la Mesa, 31 July to August 1, 1905, *Rose 5132* (holotype (based on *Atelophragma hidalgense* Rydb.): NY000000006104 digital image!: isotype US0004123 digital image!).

Atelophragma hidalgense Rydb., Bull. Torrey Bot. Club 55: 159. 1928

Astragalus strigulosus var. *gracilis* Hemsl., Biol. Centr.-Amer., Bot. 1: 266. 1880.

Characteristically with flattened pods, and short racemes.

Distribution:—Hidalgo and Queretaro (Fig. 11).

Habitat:—Rholytic, stony and rocky brown soils and wet slopes, hillsides; tropical deciduous forest; oak forest; pine-oak forest; roadside; 1400–2200 m.

Specimens examined:—HIDALGO: 11 February1982, Brecha Trancas-Nicolás Flores, a 16 km al NE de Tranchas (Cerro Prieto), *P. Tenorio L. 25, R. Hernández M.* (MEXU, NY); 26 June 1939, Mountain ravine. Alt. 4500 ft., *V. H. Chase 7160* (NY);; 9 July 1992, Entre la Ventolera y Verdosas*, V. M. Huerta B. 1681* (IEB, MEXU); 25 January 1991, Los Beneficios, por Carricillo, *J. I. Guadián M. 9122* (ENCB, IEB, MEXU); 14 August 1965, 7 km al N de Cardonal, *L. González Q. 2870* (ENCB). **QUERÉTARO:** 22 November 1994, Alrededores del poblado El Doctor*, J. Orozco H. 11011, R. Hernández M., C. Orozco L*. (ENCB, IEB, MEXU)

41.2. ***Astragalus hidalgensis*** (Rydb.) Barneby var. ***protensus*** Barneby, Mem. New York Bot. Grad. 13(1): 176. 1964

Type:—MEXICO, Hidalgo, Jacala, mountain ravine, 4500 ft., 26 June 1939, *V H. Chase 7160* (holotype: NY 00005801!; isotype: ARIZ 1cc8ba35-b837-49c1-b699-03d2d84fbb44, GH00059419 digital image!, MICH 1107111 digital image!).

Distribution:—Endemic to south of Mexico. Locally distributed in Hidalgo and adjacent areas of Querétaro and Guanajuato (Fig. 11).

Habitat:—Canyons, rhyolitic, stony and limestone soils, humid slopes; pine-oak forest, pine forests; oak forest; adjacent to corn crops; 1350–2500 m.

Examined specimens:—GUANAJUATO: 18 April 1990, Los Finitos, Mpio. Carricillo, *E. Ventura 7894, E. López* (IEB); 2 October 1990, Cerro Pichardo*, E. Ventura V. 8855, E. López P.* (IEB, MEXU). **HIDALGO.** 31 October 1964, Above Jacala*, H. D. Ripley 13607, R. C. Barneby* (MEXU, NY); 6 November 1979, 20 kms. al Noroeste de Zimapan, *R. Hernández M. 3859* (CAS, ENCB, MEXU); 6 September 1979, 2 km. al NE. de Trancas y 13 km. al NE. de Zimapan, rumbo a Jacala, *A. Delgado S. 1117, J. García y R. Hernández* (CAS, ENCB, MEXU); 28 June 1964, Alrededores de Jacala, Mpio. De Jacala, *L. González Quintero 982* (CAS, ENCB); 31 October 1964, HidalgoIn gravelly humus on rock ledges in shade of junipersteep cool north slopes of barranca above Jacala, *H. D. Ripley 13607, R. C. Barneby* (CAS, US); 26 June 1939, Mountain ravine. Alt. 4500 ft., *V. H. Chase 7160* (NY); 28 October 1965, 20 km al NE of Zimapan, *L. González Q. 3295* (CAS, ENCB, MEXU, NY); 25 March 1992, Verdosas, Mpio. Zimapán, *V. M. Huerta B.* 1456 (IEB); 9 July 1992, Entre la Ventolera y Verdosas, *V. M. Huerta B.* 1681 (IEB); 11 February1982, Brecha Trancas-Nicolás Flores, a 16 km al NE de Tranchas (Cerro Prieto), *P. Tenorio L. 25, R. Hernández* (MEXU). **QUERÉTARO.** 1 December 2000, El Derramadero, Mpio. Tolimán, *R. Hernández M. 11915* (IEB); 24 November 1989, Piedra del Habra ±2 km, al NW del barrio de Buenavista Tilaco**,** *E. González P. 1280* (IEB, MEXU).

42. ***Astragalus hintonii*** Barneby, Mem. New York Bot. Gard. 13(1): 156–157. 1964

Perennial, dwarf. **Stems** up to 24 cm long, erect, suberect, creeping to decumbent, mostly branched, sometimes a single stem, strigose, the trichomes up to 0.4 mm long, adpressed or subadppressed, curved to straight. **Stipules** 1.2–7 mm long, connate (lowest), bidentate, the upper ones, also connate, but only basally or about half or a little more than it. **Leaves** 1–6.5 cm long, leaflets 11–27, 2–7 mm long, ovate, oblong to elliptic, retuse, or truncate and mucronate, bicolored, darker and glabrate adaxially. **Peduncles** up to 5.5 cm long, curved, ascending; the racemes 2–30 mm long, initially dense or almost so, soon lax, flowers 3–21, spreading to pendulous with age. **Flowers** purple, malva, blue-purple, yellow or light-yellow (at least in dry herbarium specimens), sometimes turining pale to brown when drying; the calyx 6.4–8.4 × 2.8–3.5 mm, strigose, trichomes black, sometimes few white ones present, the tube 3.4–4.2 mm long, campanulate, commonly purple, the teeth subulate, 1.9–4.6 mm long; the banner 1.1–1.6 × 0.5–0.9 cm, elliptic to rhombic; the wings 9–13.2 × 2.5–3.1 mm, the claw 4–5.5 mm long, the blade 6.4–9.5 mm long, oblong to obovate, lightly curved or almost straight; the keel 7.4–10.2 × 2–3 mm, the claw 3.9–5.8 mm long, the blade 4.1–5.4 mm long, obovate. **Pod** pendulous, stipitate (stipe 2–3 mm long), oblong to elliptic, 1–1.7 × 0.3–0.8 cm, straight or slightly curved, ventrally lightly carinate, dorsally smooth or shallowly and openly grooved, the valves papery, green-yellowish to light borwn, septum incomplete; ovules 10–16; seeds 1.2–1.8 mm long, mitten shape, light brown to olive green, shiny, the edge sometimes lighter-brown than the center.

Distribution:—Distributed in isolated localities along the Transverse Neovolcanic Mass, one in Michoacán and Estado de Mexico and the other in central Veracruz, near the border with Puebla.

Represented by two varieties, distinguished according to petals (banner) size, bracts size, and pubescence on ovary and pod.

1. Calyx teeth 2.8–4.6 mm long; the banner 11–13 mm long; bracts 3–5.5 mm long, lanceolate to elliptic; ovary and pod minute strigose; Michoacán and Estado de Mexico ..... **var. *hintonii***
- Calyx teeth 1.9–2.6 mm long; the banner 14–15.6 mm long; bracts 1–2.5 mm long, ovate; ovary and pod glabrate; Veracruz .... **var. *cofrensis***

42.1. *Astragalus hintonii* Barneby var. ***cofrensis*** Barneby, Mem. New York Bot. Gard. 13: 158. 1964

Type:—MEXICO, Veracruz, Cofre de Perote above Los Pescados, 10,200 feet, 15 May 1938, *E. K. Balls & W. B. Gourlay B-4624* (holotype NY 00005803!; isotype: US00004121 digital image!, Main differences as in key. Stems short, 8–24 cm long; stipules bidentate all, with similar size; peduncles up to 1.5 cm long; bracts 1–2.5 mm long; the calyx with white trichomes; the banner 14–15.6 mm long.

Distribution:—Endemic to southern Mexico. Exclusive to the mountains of Veracruz (Cofre de Perote volcano), rare (Fig. 12).

Habitat:—Clayey, brown soils and volcanic rocks; conifer forest; 3100–4200 m.

Comments:—In this region, *A. micranthus* var. *seatonii* is also found; both species have stipitate pods, but they can be separated by the petal size and pod shape, *A. micranthus* has much smaller flowers (calyx 2.5–3.1 mm long, banner 4.5–5.2 mm, wings 4.4–4.8 mm, keel 3.9–4.6 mm) and triquetrous pod.

Specimens examined:—VERACRUZ: 3 June 1976, Cofre de Perote, *M. G. Zolá et al. 48, z-4*8 (ENCB, MEXU, NY); 25 May 1938, Above Los Pescados, Cofre de Perote, *E. K. Ballls 4624, W. B. Gourlay* (NY) 8 June 1989, Vereda de Cruz Blanca a Rinconada, *C. Durán 826, J. Becerra* (MEXU); 25 June 1986, Entre Tenextepec y Los Altos, Mpio. Perote, *M. Cházaro 3742* (IEB).

42.2. *Astragalus hintonii* Barneby **var. *hintonii***

Type:—MEXICO, Michoacán, ascent of Cerro Pelón from Zitacuaro, distr. Zitacuaro, 3600m, 14 September 1938, *G. B. Hinton 13240* (holotype: NY00005802!; isotype: TEX-LL00371235!, GBH013240 digital image!, K000118207 digital image!, P00585371 digital image!, US00004124, UC1113910 digital image!, S-G-10224 digital image!).

Astragalus hintonii Barneby, Mem. New York Bot. Gard. 13(1): 156–157. 1964.

Main differences as in key. Stems buried, short, up to 19 cm long; stipules of different size, the upper one the longer, the lowest ones the shorter and wider, forming a lax sheath; peduncles up to 5.3 cm long; the calyx with mixed black and white trichomes; the banner short, 11–13 mm long.

Distribution:—Endemic to southern Mexico; mountains of Michoacán (between Zitácuaro-Cerro Pelón and Cerro San Andrés), rare (Fig. 12).

Habitat:—Paddocks; roadside; hillsides; fir forest; flooded grasslands; subalpine grassland with pine; pine forest; juniper scrubland; pine-fir forest; 2940–3589 m.

Comments:—In this region, there are other two species with tumescent (bulged), dorsoventrally flattened, oblong to elliptic and stipitate pod, *A. guatemalensis* var. *brevidentatus,* and *A. strigulosus*, this last one with white petals; while *A. g.* var. *brevidentatus* shows shorter (calyx 3.2–6 mm, wings 8–10.5 mm, and keel 6.8–8.3 mm) and more amount of flowers, averaging 20–30 flowers per raceme, and slightly larger pod (21 mm).

Specimens examined:—MICHOACÁN: 14 September 1938, Distrito Zitacuaro. Alt. 3600 m, *G. B. Hinton 13240* (NY, TEX-LL); 6 September 1960, Summit of Cerro San Andres, ca. 12 kms (straigh line distance) north of Ciudad Hidalgo, *J. H. Beaman 4299* (NY); 16 October 1991, Cerro La Taza, Mpio. Huiramba, *E. García et al. 3965* (IEB); 2 August 2001, Angangueo, Sierra Chincua*, M. G. Cornejo T. 263, G. Ibarra M.* (IEB, MEXU); 27 August 1986, 300 m ESE del Pozo Az-9, Campo Geotérmico "Los Azufres", Mpio. Zinapécuaro, *E. Carranza G. 355* (IEB); 29 August 1987, parte alta del Cerro San Andrés, *S. Zamudio R. 5559* (IEB, MEXU); 13 July 1991, Laguna

de San gregorio, Mpio. Santa Clara del Cobre, *J. M. Escobedo 1947* (IEB); 7 August 2010, Ladera W de la cima del Cerro San Andres, Mpio., Ciudad Hidalgo, *G. Aguilar G. 66, S. Zamudio, J. J. Von Taden, H. Von Taden* (IEB); 22 September 1988, Prersa Pízcuaro, Mpio. Zinapécuaro, *M. J. Jasso 166* (IEB); 17 September 1995, Llano Las Papas, Mpio. Angangueo, *Rzedoswki 53773* (IEB); 27 June 2012, Cima del Cerro San Andres, ladera W, Mpio. Cd. Hidalgo, *G. Aguilar A. 881, S. Zamudio* (IEB); 4 August 1994, Alrededores de la Presa Llano Grande, al E de Los Azufres, *E. Carranza 4821* (ENCB, IEB, MEXU); 6 September 1987, La Lagunita, cerca de San Gregorio, Mpio. Santa Clara del Cobre, *Rzedowski 44638* (IEB); 8 September 1987, Llano Largo, cerca de Los Azufres, Mpio. Zinapécuaro, *H. Díaz B. 3935* (IEB); 7 July 1989, Presa la Gachupina, lado SW, *M. J. Jasso T. 1599* (ENCB, IEB, MEXU); 7 July 1989, Llano Los Ajolotes, Los Azufres, *M. J. Jasso T. 1227* (ENCB, IEB, MEXU); 27 June 2012, Cima del Cerro San Andrés, 1 776 m al SW de las antenas, Mpio. Ciudad Hidalgo, *G. Aguilar A. 904, S. Zamudio* (IEB).

43. ***Astragalus hornii*** A. Gray var. ***minutiflorus*** M. E. Jones, Proc. Calif. Acad. Sci. II. 5: 677. 1895

Type:—MEXICO, Baja California, San Jorge, 17 March 1889, *T. S. Brandeee s.n.* (holotype: CAS0000952 digital image!; isotype: UC not seen).

Astragalus bajaensis E. Sheld., Minnesota Bot. Stud. 9: 169. 189.—*Astragalus hornii* var. *bajaensis* M. E. Jones, Rev. N.-Amer. *Astragalus* 104. 1923.—*Phaca bajaensis* (E. Sheld.) Rydb., N. Amer. Fl. 24: 358. 1929.

Astragalus miserandus Greene, Erythea 3: 76. 189.

Annual. Sometimes forming patches 5 m wide and 0.5 m high. **Stems** up to 60 cm long, hollow, with tan, *reddish or purple tones, minute strigose, the trichomes up to 0.5 mm long. **Stipules** 2.5–7 mm long, the lowest connate, the upper ones semi-clasping, or only a tiny narrow line around stem´s circumference, triangular, deltoid to lanceolate. **Leaves** 1.5–13 cm long, leaflets 18–33, 3–23 mm long, oblong, elliptic to obovate, distally notched, adaxially glabrate. **Peduncles** 2–15 cm long, ascendant, incurved or straight; the racemes 1–3.5 cm long, dense when young, somewhat lax with age, subglobose or oblong, flowers 8–20. **Flowers** white, whitish or cream, sometimes with lilac tones or rose; the calyx 3.8–6 × 2–2.9 mm, lax strigose, trichomes up to 1.1 mm long, white o white and black mixed, the tube campanulate, 2.2–4.4 mm long, the teeth 1.5–2.5 mm long, subulate to triangular; the banner 7.2–10.4 × 3.5–8 mm, recurved, spathulate, elliptic to rhombic, slightly obcordate apically; the wings 6.8–9.9 × 1.4–3.1 mm, the claw, 2.7–4.5 mm long, the blade 4.5–7 mm long, linear, oblong, to oblanceolate, obtuse or emarginate; the keel 5.7–8.4 × 1.9–2.8 mm, the claw 2.9–4.5 mm long, the blade 2.8–4.6 mm long, semi-circular or semi-obovate. **Pods** close together to each other around rachis and forming a dense oblong raceme head-like), the body 0.9–1.8 × 0.4–0.9 cm, spreading or somewhat ascending, sessile, ovoid to obovate, persistent for a time, not quickly caducous, inflated bladder-like, rounded basally, symmetric, very rarely gibous, distally contracted in a narrow beak, ventrally straight o almost so, very rarely arquate, dorsally gibous, the valves membranous, papery, ochre, minute strigose, trichomes 0.4–0.7 mm long, appressed or ascending, turning glabrate with age, softly reticulate, sometimes with light pink tones; ovules 10–17; seeds 1.4–2.3 mm long, brown with purple tones. **R. V. Moran 29432* (ENCB, MEXU, NY).

Distribution:—This variety is endemic of the the peninsula of Baja California, in both states, in Baja California at the western end of the Sierra San Pedro Martir, also, along the western coast, 30°19'–30°42'N (Vicente Guerrero, Punta Gorda, 5–6 km to the NNW of Prof. Graciano Sánchez, between Campo Sarabia and La Salina, Venustiano Carranza and Nueva Odisea), apparently absent to the south, but appearing in the political limits of Baja California Sur, 27°52' (lagoons and bays, Guerrero Negro), again absent and appearing on the coasts 26°03'N–26°17'N, (adjacent to coasts in San Juanico and Buenaventura). Also, in California (USA) (Fig. 12).

Habitat:—Plains; sandy soils; cemented terraces; saline lagoons adjacent to coastal dunes; just behind coastal dunes; small drainages and flats; associated with riparian-halophytic vegetation; creosote bush scrub; associated with saltgrass, pickleweed, as well as mesquite, psamophilic vegetation; 0–15 m.

Reported also in elevations of 1100 m NW San Pedro Mártir (*I. L. Wiggins 9179*, NY).

Comments:—The saline areas where this species occurs are also inhabited by other *Astragalus* with purple, lavander, white, lilac or pink flowers and with sessile, inflated bladder-like, longer than 7 mm pods, such as *A. harbisonii, A. insularis* var. *quentinus, A. magdalenae* var. *magdalenae* and *A. trichopodus* var. *lonchus*. *Astragalus insularis* var. *quentinus* is easily recognized by its racemes with very few flower (3–9). The other three ones are almost identical among them. However, *A. hornii* var. *minutiflorus* can be recognized and differentiated from the other species by its stipules being connate and by the oblong to head-like racemes. Ecologically, *A. hornii* var. *minutiflorus* inhabit in hard coastal terraces and saline lagoons, adjacent but behind the coastal dunes.

Specimens examined:—BAJA CALIFORNIA: 5 July 1980, El Socorro, *R. V. Moran 28968* (NY, SD); 19 October 1980, north of Laguna Mormona, *R. Moran 29432* (CAS, ENCB, MEXU, NY, TEX-LL, US); 2 October 1938, Los Pozos, northwestern end of Sierra San Pedro Martir, *I. L. Wiggins 9179* (CAS, NY, US); I-1889, San Quentin Bay, *E. Palmer 646* (NY); 16 December 1953, Camino de Playa Colonia Guerrero, *Harbison, Higgins s.n.* (CAS, SD); 10 May 1886, San Ramon, *C. R. Orcutt 1324* (NY, US). **BAJA CALIFORNIA SUR:** 13 February1973, La Bocana de San Gregorio, *R. V. Moran 20095* (NY, US); 3 July 2016, Pequeño drenaje en pisos a lo largo de la carretera al este de Adolfo López Mateos; al oeste de Ciudad Insurgentes y al este de Bahía Magdalena, *J. Rebman 31152, R. Domínguez, J. F. Pio León* (SD); 13 February1973, La Bocana de San Gregorio, *R. Moran 20095, J. L. Reveal* (SD).

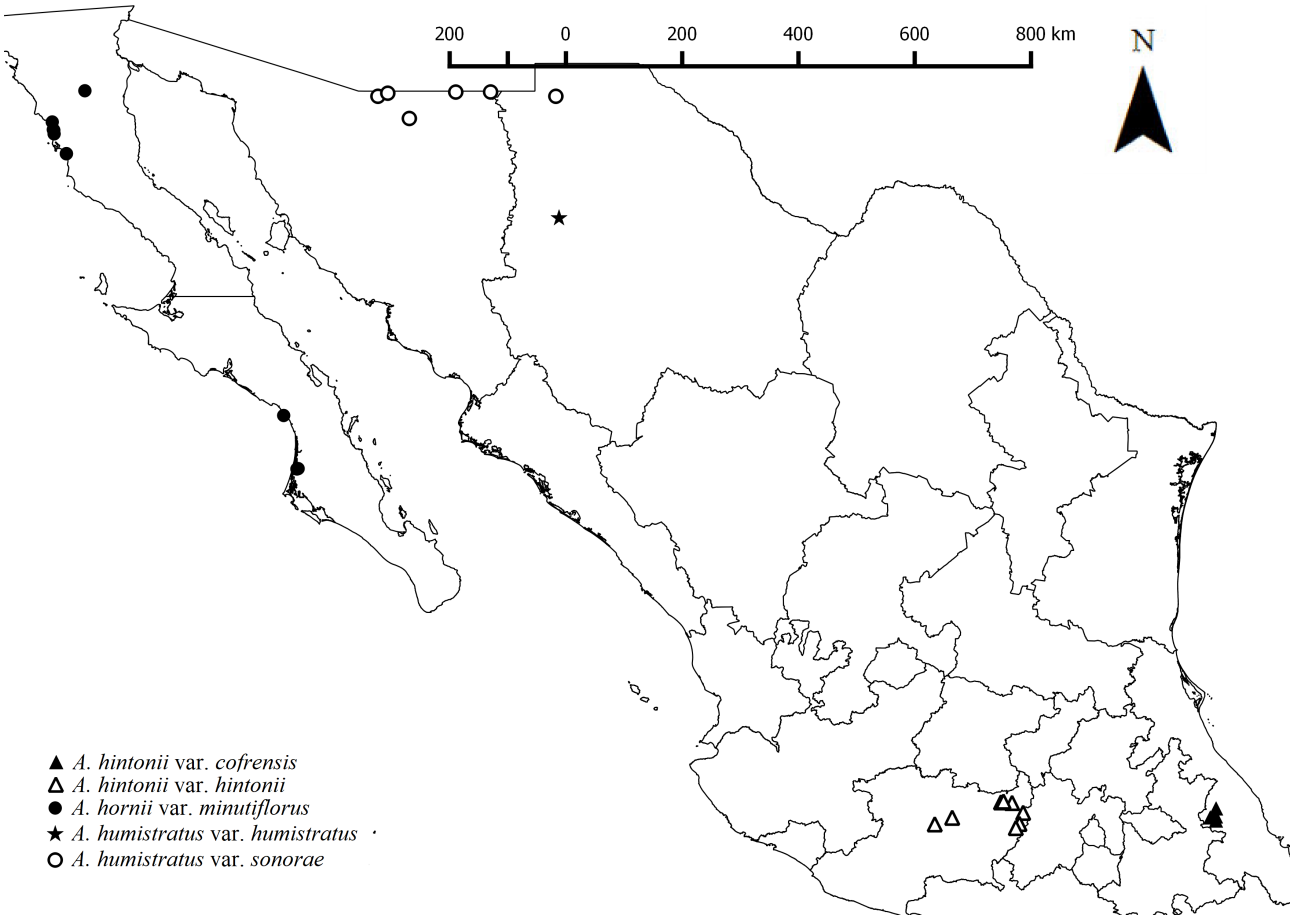

FIGURE 12. Map showing the distribution of *Astragalus hintonii* var. *hintonii, A. hintonii* var. *cofrensis, A. hornii* var. *minutiflorus, A. humistratus* var. *humistratus*, and *A. humistratus* var. *sonorae* in Mexico.

44. *Astragalus humistratus* A. Gray, Pl. Wright. 2: 43: 1853

Perennial. Stems up to 85 cm long, distally ascendingt, suberect, prostrate or creeping, with radial growth from base, pubescence dolabriform, the trichomes united in middle of two lateral arms, in the form of "t", the arms of equal or unequal size, dense, cinereous, green, greenish to silvery. **Stipules** 1.6–13 mm long, clasping and connate, all large and papery, semi-transparent, nearly the size of leaflets, the lowest ones subtruncate or bidentate, the upper ones, longer, triangular to lanceolate, acute, not bidentate. **Leaves** 1–7.5 cm long, leaflets 5–19, 2–20 mm long, oblong, ovate, elliptic to obovate, obtuse and mucronate, adaxially glabrate or pubescent. **Peduncles** 1–9.4 cm long, curved, ascending; the racemes 1–14 cm long, flowers 3–30, compact when young, turning lax with age. **Flowers** whitish-green, whitish-rose, magenta, purple to purple-magenta, sometimes dark-blue, rose but drying purple; the calyx 4.5–8 mm long, cinereous, the trichomes white, rarely few black trichomes, the tube 2.4–3.8 mm long, campanulate, the teeth 2–4.5 mm long, subulate; the banner 5.9–11.9 mm long, dorsally carinate, retuse; the wings 5.6–10.8 mm oblanceolate to obovate; the keel 5.1–10 mm long, triangular to deltoid. **Pod** 0.6–2 x 0.2–0.6 cm, ascending, spreading or slightly deflexed, commonly humistrate, semi-ovoid, inflated bladder-like, oblong to elipsoid, basally rounded, dorsally sulcate, distally contracted in a triangular beak, the valves somewhat fleshy when young, leathery or papery with age, strigose

or villose, ochre or brown with age, reticulate or almost so, septum absent; seeds 1.7–2.8 mm long, subquadrangulate, mitten shape, brown or black, sublustrous.

Distribution:—In Mexico, recorded from extreme northern Sonora (Sonoita, Santa Cruz, Cananea, Nogales, and Agua Prieta), along the U.S. border, and central-west Chihuahua (Gómez Farías, Babícora and Guerrero).

Comments:—In the region where this species occur, two other *Astragalus* two other *Astragalus* species (*A. amphioxys* and *A. arizonicus*) with dolabriform pubescence are also found. *Astragalus arizonicus* has linear to oblong triquetrous pod. The petals (banner 16.2–24.5 mm, wings 15.1–22.4 mm, and the keel 13.2–19.6 mm) of *A. amphioxys* are almost twice as large as those of *A. humistratus.*

Two of the six recognized varieties are present in northwestern Mexico, and theya are separated on the basis of the leaflets pubescence.

1. Foliage silvery-canescent, leaflets equally pubescent in both faces; in Mexico, Chihuahua and Sonora..... ..... ***A. humistratus* var. *sonorae***
- Foliage finely pubescent, green, leaflets subglabrate or glabrate adaxially; in Mexico, exclusive from Chihuahua .... ***A. humistratus* var. *humistratus***

44.1. *Astragalus humistratus* A. Gray var. *humistratus*

Type:—USA, New Mexico, Pebbly bed of a stream and on hills under pine-trees, near tiie copper mines. Aug 1851, *Wright 1003* (holotype: GH 00058773 digital image!; isotype: NY00005462!, MO-022529 digital image!, P00585374 digital image!, K000999282 digital image!, US00004159 digital image!).

Astragalus humistratus A. Gray, Pl. Wright. 2: 43: 1853.—*Tragacantha humistrata* Kuntze, Revis. Gen. Pl. 2: 945. 1891.—*Batidophaca humistrata* Rydb., N. Amer. Fl. 24(6): 315. 1929.—*Tium humistratum* Rydb., Bull. Torrey Bot. Club 32: 660. 1906.—*Ctenophyllum humistratum* (A. Gray) Rydb. ex A.Heller, Cat. N. Amer. Pl. (ed. 3) 214. 1914.

Astragalus datilensis (Rydb.) Tidestr., Proc. Biol. Soc. Washington 50: 21. 1937.

Distribution:—Rare in Mexico, intermountain valleys of western Chihuahua (Gómez Farías, Laguna de Babícora and Guerrero). Also, in Arizona, New Mexico, Colorado, and Texas (USA) (Fig. 12).

Habitat:—Grasslands in floodplains; canyons and steep ravines; 2150–2200 m.

Specimens examined:—CHIHUAHUA: 10 September 1994, Laguna de Babícora*, G. Quintana, E. Estrada 3551* (ANSM, NY).

44.2. *Astragalus humistratus* A. Gray var. *sonorae* (A. Gray) M. E. Jones, Contr. W. Bot. 10: 58. 1902

Type:—MEXICO, Sonora, Mountain valleys, between the San Pedro and the Sonoita, September 1851, *Wright 1005* (holotype: GH00263299 digital image!; isotype MO149241 digital image!, GH00245337 digital image!).

Prostrate, annual with single stems (*A. L. Reyna 2009-56 et al.* (USON)), and with purple and white flowers.

Distribution:—This variety has a larger distribution, along the northern border of Sonora, from Sonoita, through Santa Cruz, Cananea, Nogales to Agua Prieta and isolated in central-western Chihuahua (Guerrero). Also found in Arizona and New Mexico (USA) (Fig. 12).

Habitat:—Intermountain valleys; igneous and alluvial soils; steep slopes with grassland; floodplains with grassland; oak-pine forest; 1613–2250 m.

Specimens examined:—CHIHUAHUA: 18 August 1998, 2 km S of Santo Tomas in the Barrio San Ignacio, ca. ½ km S of Rio Papigochic, *R. Spellenberg 12692, L. Brouillet, T. K. Todsen* (NY). **SONORA**: 1851, Between the San Pedro and Sonoita rivers, *C. Wright 1005* (fototype, CAS); 19 May 2010, Just south of New Mexico border, W side Animas, Valley, 54.2 km (by air) E of Agua Prieta, Cuenca Los Ojos Foundation property, *T. R. Van Devender 2010-555, A. L. Reina G*. (USON); 26 April 2009, Animas Valley, ca 57.9 km E of Agua Prietaa, Cuenca Los Ojos Conservation Area, *A. L. Reina G. 2009-56, T. R. Van Devender, B. T. Wilder, J. L20-V1987, Anderson* (USON); 17 July 2001, 7.8 km NW of Santa Cruz on road to Nogales, *A. L. Reina G. 2001-544, T. R. Van Devender* (USON); 16 August 2001, 3 km north of Santa Cruz on road to Nogales, *T. Van Devender 2001-707, A. L. Reina, J. Sánchez E. O. Gutiérrez, E. Gómez L.* (MEXU20 May 1987, 10 km al S de Cananea, Carretera a Arizpe, *P. Tenorio L. 13559, C. Romero de T.* (MEXU).

45. ***Astragalus hypoleucus*** S. Schauer, Linnaea 20: 747. 1847

Type:—MEXICO, In montanis Mexico, loco non notato, *Aschenborn no. 343* (No type examined, but the full description decisive (Barneby, 1964, page 1101).

Tragacantha hypoleuca (S. Schauer) Kuntze, Revis. Gen. Pl. 2: 945; *Hamosa hypoleuca* (S. Schauer) Rydb., Bull. Torrey Bot. Club 54: 334. 1927.

Astragalus luisanus M. E. Jones, Rev. N.-Amer. *Astragalus* 275. 1923.

Perennial. Stems several, up to 35 cm long, diffuse, semi-protrate, creeping, suberect, incurved ascending, erect or subterranean and emerging again, minute strigose, the trichomes up to 1 mm long, some adpressed, dolabriform, the trichomes united in middle of two lateral arms, in the form of "t", the arms of equal or unequal size, mixed with few straight and longer ones. **Stipules** 1–6.5 mm long, clasping and connate, attached to almost half or even more of it, the lowest ones, shorter, abaxially pubescent. **Leaves** 1–6 cm long; leaflets 11–23, 3–12 mm long, oblong, elliptic, to oblanceolate, acute, obtuse or distally notched, dorsally keeled, pubescent in both faces, abaxially denser. **Peduncles** 2.5–9.3 mm long, ascendant, incurved; the racemes 1–10.2 cm long, flowers 10–30. **Flowers** lavender, blue-purple, violet, purple or, mixed with white and purple colors, occasionally whitish or yellowish-cream; the calyx 3.1–5.4 × 1.7–2.4 mm, strigose, trichomes black o black and white mixed, the tube campanulate to turbinate, 2.2–3 mm long, the teeth 0.8–2.6 mm long, subulate to triangular; the banner 6–8.2 × 3–4.3 mm, ovate, elliptic or rhombic, recurved, distally retuse; the wings 6–8.7 × 1.5–2.2 mm, the claw 2–3 mm long, the blade 4.2–6.3 mm long, oblong to obovate, emarginate or obtuse, incurved; the keel 4.5–6.6 × 1.6–2.2 mm, the claw 2–3 mm long, the blade 2.7–4 mm long, incurved. **Pod** 7–12.5 × 2–4 mm, deflexed, sessile or elevated in a imperceptible and tiny 0.2–0.5 mm long gynophore, narrow oblong, triquetrous to trigonous, straight o strongly curved, basally rounded, distally contracted in a short straight or curved beak, ventrally carinate, dorsally grooved, the valves thin, fleshy, turning hard or stiffly papery with age, densely strigose, with white or white and black mixed trichomes, septum complete, thence the pod bilocular; seeds 1.3–1.9 mm long, mitten shape brown to olive-green.

Distribution:—One of the species with the largest distribution in Mexico, in mountainous areas throughout most of the Mexican Highplains; from Coahuila, Nuevo León and Tamaulipas, through San Luis Potosí and Zacatecas to Querétaro, State of Mexico, south of Puebla and isolated in the center of Oaxaca (Fig. 13).

Habitat:—Stony hills; calcareous and gypsic soils; grassy slopes; clearing scrub forest; piedmont scrub; oak forest; xeric scrublands; grasslands with prairie dogs; wet gullies; Douglas fir-fir-pine forest; pine-manzanita-sumac association; peach crop; 1400–3500 m

Comments:—*Astragalus hypoleucus* is the only species with dolabriform pubescence distributed south of the Tropic of Cancer, from northeastern San Luis Potosí to Oaxaca. The other four species with dolabriform trichomes are *A. amphioxys* (Chihuahua)*, A. arizonicus* (Sonora), *A. humistratus* (Sonora and Chihuahua) and *A. lotiflorus* (Coahuila). Sometimes abundant in overgrazed areas along road.

Specimens examined:—AGUASCALIENTES: 4–8 September 1967, Ca. 20 km. east of Rinón de Romos, road to Asientos, between Cerro Altamira and Cerro de San Juan, *R. McVaugh 23701* (NY); 31 October 1967, Cerro de San Juan ± 5 km al E de Tepezalá, *Medellín-Villa-Takaki s.n.* (IBUG, MEXU); 1 November 1967, Ladera sur del Cerro Palaira, 4 km al W de Asientos, *Rzedowski 25088* (ENCB). **COAHUILA:** 27 May 1980, Ejido El Puerto, aprox. 6 km Los Lirios, Mpio. Arteaga, *J. A. Villarreal 704, R. López A.* (ANSM). 29 July 1995, Camino Los Lirios-El Cercado, Mpio. Arteaga, *Hinton et al. 25407* (ANSM); 24 June 1994, Sierra de Arteaga, Rcho. El Tirol, Cañón de Jamé, 12km NE Jamé, *J. A. Villarreal 7707, J. Valdés R, M. A. Carranza* (ANSM, MEXU); 3 October 1986, Cañón Jame aprox. 20 km. al Noreste de la carretera Nacional (57), *J. A. Villarreal 3403, M. A. Carranza* (ANSM, ENCB, MEXU); 22 June 1992, Sierra Zapalinamé*, Hinton 22076 et al* (NY); 23 October 1963, Carneros Pass, 23 mi. south of Saltillo, *H. D. Ripley 13267, R. C. Barneby* (MEXU, NY); 19 May 1974, Lomas de Lourdes, Saltillo, *J. Marroquín 2777* (ANSM); VIII-1944, Aserradero, Sierra Zapalinamé*, Hno. E. Lyonnet [440800015]* (MEXU); ? August 1944, Aserradero, Sierra Zapalinamé*, E. Lyonnet [440800015]* (MEXU). **ESTADO DE MEXICO:** 26 June 1977, Cerro Ahumada, 6 km al N de Huehuetoca, *Rzedowski 35003* (ENCB); 10 October 1976, Terrenos de Jaltepec*, A. Ventura A. 2274* (ENCB); 10 August 1977, Entronque Cuautlacingo-Otumba*, F. J. Espinosa 231* (ENCB); 15 June 1976, Otumba, Ahuatepec*, A. Ventura A. 1598* (ENCB); 23 July 1974, Cerro del La Cruz, 5 km al NW de Tepotzotlán, *Rzedowski 31939* (ENCB); 8 June 1981, Cerro La Manga, Mpio. Apaxco, *Romero-Rojas 1337* (ENCB); 3 August 1976, partes basales del Cerro Sincoque, del lado SW, Mpio. Huehuetoca, *Rzedowski 34357* (ENCB). **GUANAJUATO:** 13 October 1986, *Rzedowski 41648* (CIIDIR, ENCB, IBUG, IEB); 18 October 1986, 27 km al S de Dolores Hidalgo, sobre la carretera a San Miguel Allende, *Rzedowski 41047* (CIIDIR, ENCB, IEB); 28 June 1996, Cerros calizos cercanos a Calera, 11 km al N de

Irapuato, *Rzedowski 53161* (ANSM, CIIDIR, ENCB, IEB, MEXU, USON); 27 June 1987, 2 km al NE de Empalme Escobedo, *Rzedowski 43448* (CIIDIR, ENCB, IBUG, IEB, MEXU); 21 June 1971, San Miguel de Allende, *P. Genelle 811* (NY); 28 October 1963, Open Stony Summits. Sierra back of Guanajuato, *H. D. Ripley 13343, R. C. Barneby* (MEXU, US); 28 July 1986, 5 km al ENE de Empalme Esobedo, Mpio. De Comonfort, *Rzedowski 40113* (ENCB, IBUG, IEB); 20 July 1991, San Felipe, *Rzedowski 50671* (IEB, MEXU); 1 August 2005, El Charco del Ingenio, Mpio. San Miguel Allende, *F. Rodríguez 3053* (IEB); 5 August 1991, La Misión de Abajo, carretera hacia Victoria, *E. Ventura V. 9406, E. T. López* (ENCB, IEB, MEXU); 6 April 1990, Mesas del pueblo, *E. Ventura V. 7863, E. T. López* (ENCB, IEB, MEXU); 21 August 1990, Victoria, Los Nogales, *E. Ventura V. 8599, E. T. López P.* (ENCB, IEB, MEXU); 5 June 1990, La Concepción, *E. Ventura V. 8055, E. T. López P.* (ENCB, IEB, MEXU,); 31 July 1991, *E. Ventura V. 9360,* La Merced, carretera Pozos-San José, Mpio. San Luis de la Paz, *E. T. López P.* (IEB); 12 June 1990, Ojo de Agua, Mpio. De Pozos, *E. Ventura V. 8074, E. López P.* (ENCB, IEB); 4 September 1989, 10 km al Sur de Pozos, *E. Ventura E. 7193, E. López P.* (IEB, MEXU)12 August 1990, 4 km al S de la cumbre del Cerro El Cubilete, *Rzedowski 49801* (IEB, MEXU); 11 August 2005, 4.5 km de Aguas Buenas, Mpio. Silao, *E. Pérez C. 4565* (IEB); 14 September 2002, Cerro La Cañada, 1 km al N del Charape de los Pelones, *J. Gutiérrez G. 536* (IEB, MEXU); 8 September 1988, Cerca de Palmillas, al NE del Municipio Comonfort, *A. Mora B. 910* (IEB); 24 September 1994, 4 km al S de Pozoz, Mpio. San Luis de la Paz, sobre la carretera a San José, *Rzedowski 52642* (IEB); 24 September 1994, 5 km al W de Los Pozoz, Mpio. San Luis de la Paz, sobre el camino a al autopista, *Rzedowski 52594* (IEB); 10 July 1988, Alrededores de El Guajolote, Mpio. San José de Iturbide, *Rzedowski 46913* (IEB); 12 August 1990, 2 k al S de San José de Tránsito, Mpio. Silao, cerca del aeropuerto, *Rzedowski 48927* (IEB); 23 September 1994, al W de La Españita, Mpio. San José de Iturbide, *Rzedowski 52565* (IEB). **HIDALGO:** 9 November 1976, Mineral de la Reforma, *M. Medina C. 1769* (CIIDIR, ENCB, MEXU); 13 August 1913, Tula, *C. R. Orcutt 6255* (MEXU, NY); IX-1903, El Salto, *J. N. Rose 7089, J. H. Painter* (NY); 2 August 1902, El Salto, *C. G. Pringle 9721* (NY, US); 20 July 1896, Near Tula, *C. G. Pringle 6366* (ENCB, NY); 6 October 1980, Camino a Minas de San Miguel, 10 kms al norte de Zimapán, *R. Hernández 5111, D. Rodríguez* (MEXU, NY); 12 August 1981, Mesa Doñana, *R. Hernández 6356 et al.* (MEXU, NY); 12 August 1990, Barranca "El Salto", al SW del poblado Tecajique, vertiente oriental de la sierra de Chicavasco, ejido Tecajique, *I. Díaz V. 938* (IBUG, MEXU); 7 June 1976, Zempoala, *A. Ventura A. 1497* (CAS); 8 November 1975, Terrenos de Tepeapulco, *A. Ventura A. 527* (ENCB); 28 September 1976, Cerro de Santa María Tecajete, *A. Ventura A. 2190* (ENCB); 16 December 1975, El Xihuingo, *A. Ventura A. 715* (ENCB); 31 August 1980, 2 km al N de Huixmi, Mpio. Tlaxiaca, *Rzedowski 36969* (ENCB); 29 August 1965, Cerro Ventoso, entre Pachuca y Real del Monte, *Rzedowski 20574* (ENCB); 9 September 1976, Xolostitla, 8 km al ESE de Pachuca, Mpio. Pachuqilla, *M. Medina C. 1751* (ENCB); 24 March 1981, Unos 10 Kms. al este de Metzquititlan, (El Banco), *R. Hernández M. 5572, D. Rodríguez B.* (ENCB, MEXU). **JALISCO:** 1 September 1958, 2 miles southwest of San Juan de Los Lagos, *R. McVaugh 17617* (CAS, MEXU, NY). **MICHOACÁN.** 3 September 1991, Cerro del Mezquital, *J. M. Escobedo G. 2104* (ENCB, IEB, MEXU 31 July 1992, Cerro Las Cinsinillas, *J. M. Escobedo 2376* (ENCB, IEB, MEXU). **NUEVO LEÓN:** 16 May 1981, Cerro del Potosí, camino a la cima del cerro, *J. A. Villarreal 1217, L. Arce, M. A. Carranza* (ANSM, MEXU); 23 July 1993, Ascención-La escondida, *Hinton et al. 23101* (ANSM); 21 June 2003, 5 km por Carr. Dr. Arroyo-Matehuala, *E. Estrada 15784, C. Yen* (MEXU); 24 August 1989, Sierra El Soldado, camino San Antonio Peña Nevad-Puerto Pinos, Mpio. Mier y Noriega, *J. A. Villarreal 4917, M. A. Carranza, G. Nesom, J. Norris* (ANSM, TEX); 26 August 1989, 12 km al NNE de La Encantada, camino a Zaragoza, Mpio. Zaragoza, *J. A. Villarreal 5136, M. A. Carranza, G. Nesom, J. Norris* (ANSM); 17 June 1992, Áreas cercanas a Santa Rita, Mpio. Galeana, *J. A. Villarreal 6876, M. A. Carranza* (ANSM); 16 May 1981, Cerro del Potosí, camino a la cima del cerro, *J. A. Villarreal 1217, L. Arce. M. A. Carranza* (ANSM); 4 June 1987, Ejido Sant Rosa, Mpio. Iturbide, *E. Estrada 912* (ANSM, IBUG, MEXU); 28 May 1987, Rancho Casas Blancas, Faldas del Cerro El Potosí, Mpio. Galeana, *E. Estrada 997* (ANSM, MEXU); 26 June 1978, Puerto el Pino, *Hinton et al. 17398* (ANSM, CIIDIR, ENCB, MEXU); 26 November 1966, Sierra Madre Oriental w. of Iturbide, ascent to Pto. de los Encinos, *H. D. Ripley 14780, R. C. Barneby* (NY); 3 April 1902, Montemorelos, *E. W. Nelson 6091* (NY); 22–23 July 1977, Ca. 1 mi WSW of San Pablo in small valley, 15 mi E of San Rafael off Highway 57, *C. Wells 68, G. Nesom* (NY, TEX-LL); 27–30 July 1977, Area of Cerro Peña Nevada, ca.12 km. NE of San Antonio Peña Nevada, 30 km E of Doctor Arroyo, N and NE slopes of mt know locally as Picacho Onofre, and ridges and valleys ca. 5 km. to the NE of this peak, *C. Wells 356, G. Nesom* (NY); 23 July 1993, Ascención- La escondida, *Hinton 23101 et al* (NY); 6 August 1971, Along Nuevo Leon Highway 60, 11 miles east of San Roberto Junction and 4.7 miles west of San marcos, *J. L. Reveal 2630, W. J. Hess, R. W. Kiger* (MEXU, NY); 4 August 1936, Hacienda Pablillo, Galeana, *M Taylor 51* (CAS); 25 October 1982, In a gully northwest of Ejido Santa Rosa, 4.1 miles south of Iturbide, Loma la Banderra, *J. W. Grimes 2331, K. Nixon, L. Dorr, S. Sundberg* (NY); 28 May 1987, Rancho Casas Blancas, faldas del Cerro El Potosí, *E. Estrada 987* (NY); 15 June 1989, Ejido Santa Rosa, *E. Estrada 1507* (NY, TEX); 23 September

1973, Along Nuevo Leon Highway 68, 12.2 miles south of the junction of highway 60 and 1.5 mile south of Pablillo, about 139 miles north of Matehuala, Sierra Madre Oriental, *J. L. Reveal 3405, N. D. Atwood* (NY); 22 July 1977/23 July 1977, Ca. 1 mi WSW of San Pablo in small valley, 15 mi E of San Rafael off Highway 57, *C. Wells 101, G. Nesom* (NY, TEX-LL); 29 October 1964, 2.5 miles S. of Galeana, *H. D. Ripley 13588, R. C. Barneby* (NY); 4 July 1985, 42.1 mi (67.3 km) SE of Hwy 57 at San Rafael on gravel road to 18 de marzo, 15.6 (25 km) E of S. Fco. Javier, *C. P. Cowan 5430, M. Luckow, N. Jacobson* (NY); 11 May 1989, Camino Los Mimbres-El Orito, *E. Estrada 1460, S. Favela* (MEXU); 20 October 1984, 12.2 mi along dirt road turn-off to Ejido Capadero. just north of Dr. Arroyo. 34.5 mi from Banco del Centro, Matehuala. Sierra, *J. Saunders-Sherrer 1352[a], K. C. Nixon* (MEXU); 23 September 1959, Puerto de Cieneguillas, Mpio. Galeana, *D. Fuentes Ch. s.n.* (ENCB); 5 July 1980, El Barreno, Mpio. Aramberri, *Hinton 17864* (ENCB). **OAXACA:** non date, Jalahui. Estudios sucesionales de la vegetación, *R. Noriega 48* (MEXU). **PUEBLA:** 19 November 1966, 12 miles n. of Tehuacan near Azumbilla, *H. D. Ripley 14733, R.C. Barneby* (NY, US); 5 August 1936, Hacienda Pablillo, Galeana, *M. Taylor 51* (NY); 12 August 1982, 10 km al S de Siberia, *R. Torres 1116, J. López, O. Oropeza y R. Sánchez* (NY); 15 April 1985, On the road to Nicolas Bravo 12.7 kms south of the Puebla-Orizaba road, ca. 1 km north of Nicolas Bravo, *J. Grimes 2788, P. Tenorio* (MEXU, NY); VII-1907, Vicinity of Puebla, Acatjinco (Dirt Esperanza), *Bro. Amable 2020, Bro Arsene* (NY); 23 July 1978, Ca. 2 km N of Saltillo La Fragua, Hwy 140 from Jalapa to Puebla, *J. M. Poole 1557, G. Guzmán* (IEB, MEXU); 16 July 1991, Hwy 28, N of Azumbilla (which is Tehuacan); upper end of Barranca Rincon Coyote at the pass between Azumbilla and Canada Morelos; ca. 4 air km S-SE of Canada Morelos, *Mayfield, A.L. Hemple, A. Jack 901* (MEXU); 30 July 1960, 1 km W of Tepiaca, *F. W. Gould 9229* (ENCB). **QUERÉTARO:** 8 August 1976, El Batán, *E. Argüelles 473* (MEXU, NY); 23 August 1961, 8 miles east of Queretaro, *U. T. Waterfall 16515* (NY); 18 August 1905, Near San Juan Del Rio, On a stony hillside, *J. N. Rose 9584, J. H. Painter, J. S. Rose* (US); 3 July 1987, Camino a Los Cues, km. 4 aprox. cerca desv. a Cotita, *E. Argüelles 2974* (IEB, MEXU); 25 September 1978, 1 km al S de Vizarrón, *S. Zamudio R. 3378* (IEB, MEXU); 19 July 1994, *R. Hernández M. 10698, J. Orozco H., C. Orozco L.* (IEB, MEXU); 16 August 1996, 4.5 km al S de Vizarrón, Mpio. Cadereyta, *S. Zamudio 9874, E. Pérez C.* (IEB); 23 August 1988, Ladera N del Peña de Bernal, Mpio. Ezquiel de Montes, *H. Díaz B. 4839* (IEB); 23 June 1991, Río Atarjea, 4–6 km al SW de El Limón, Mpio. Arroyo Seco, *E. Carranza 3220* (IEB); 1 September 1984, La Venta, *E. Argüelles 2178* (IEB, MEXU); 16 September 1977, Cerro Azul, *S. Zamudio 2445* (IEB, MEXU); 16 August 1989, 5 km al NE de bernal, Mpio. De Cadereyta, sobre la Carretera a Tolimán, *Rzedowski 48745* (ENCB, IEB); 18 November 2012, Maguey Verde, southeast of Pinal de Amoles, *D.S. Gernandt 1248, C. Reséndiz A., P. Rosas E., A. Otríz M.* (MEXU); 15 November 2000, Carretera Colón-Tolimán, *R. Hernández M. 11909* (MEXU); 2 July 1983, Camino a Los Cues No. 2, *E. Argüelles 2313* (IEB). **SAN LUIS POTOSÍ:** 13 August 1985, *F. Gómez L. 714* (ANSM, ENCB); 5 October 1961, La Joya Chica Soledad, *A. Gómez 411* (ANSM, ENCB, MEXU); *n.d.*, Sierra de Catorce, *F. Rodríguez 14* (NY); 31 October 1967, Cerro de San Juan ± 5 km al E de Tepezalá, *Medellín-Villa-Takaki s.n.* (ANSM); 12 November 1964, n.e. of Ventura, *H. D. Ripley 13773, R. C. Barneby* (NY); 20 August 1959, 18 miles northeast of San Luis Potosí, *U. T. Waterfall 15689* (NY); 12 October 1961, Alrrededores de la Joya Chica, Soledad, *A. Gómez G 494* (NY); 5 September 1961, La Joya Chica Soledad, *A. Gómez G. 411* (ENCB, NY); 13 January 1995, Aprox. 1 km al S de la Alberca, Mpio. Catorce, *E. Pérez C. 3109 et al* (IEB); 30 August 1955, 10 km al NE de Laguna Seca, Mpio. De Soledad, *Rzedowski 6349* (ENCB); 8 October 1979, Mpio. Real deCatorce, Sierra de Catorce, Cerro La Cuchilla, 13 km al E de Wadley, 1 km al E de Tierras Negras, *J. García P. 1303 et al.* (ENCB); 27 September 1955, 3 km al S de Cerro San Pedro, *Rzedowski 6162* (ENCB); 18 September 1954, Sierra de San Miguelito, al SW de la Cd. San Luis Potosi, *Rzedowski 4667* (ENCB); 21 April 1956, La Joya 4 km al NW de Ventura, Mpio. Villa Hidalgo, *Rzedowski 7546* (ENCB). **TAMAULIPAS:** 11 July 1949, 3 mi. n. of Miquihuana, *Stanford, Lauber, Taylor 2383* (US), *2395* (NY); 24 May 1976, 3 km al N de La Joya de Herrera, *F. González-Medrano 9120* (MEXU); 12 July 1983, 20 km. al Norte de la Pérdida, *F. González-Medrano* 13197 (MEXU); 12 March 1985, 5 km al NE del Ejido El Gavilán, Sierra de San Carlos, *P. Hiriart 646, V. Juárez, R. Molezadzki, J. Jiménez* (MEXU). **VERACRUZ:** 12 December 1963, Acultzingo, *H. S. MacKee 11048* (NY); 6 July 1990, Los Baños, apox 25 km al WSW de Huayacocotla, Cerro de San Nicolás de Atexcoco, Hidalgo, *Rzedowski 49554* (IEB). **ZACATECAS:** 16 August 1959, 7 miles northwest of Zacateca, *U. T. Waterfall 15607* (NY); 20 August 1974, Just W of Zacatecas, *R. W. Spellenberg 3802* (NY); 24 July 1986, Ejido Tierra Blanca, *Manrique, Lozano, Bravo 1305* (MEXU). f Miquihuana, *Stanford, Lauber, Taylor 2383* (US), *2395* (NY); 24 May 1976, 3 km al N de La Joya de Herrera, *F. González-Medrano 9120* (MEXU); 12 July 1983, 20 km. al Norte de la Pérdida, *F. González-Medrano* 13197 (MEXU); 12 March 1985, 5 km al NE del Ejido El Gavilán, Sierra de San Carlos, *P. Hiriart 646, V. Juárez, R. Molezadzki, J. Jiménez* (MEXU).

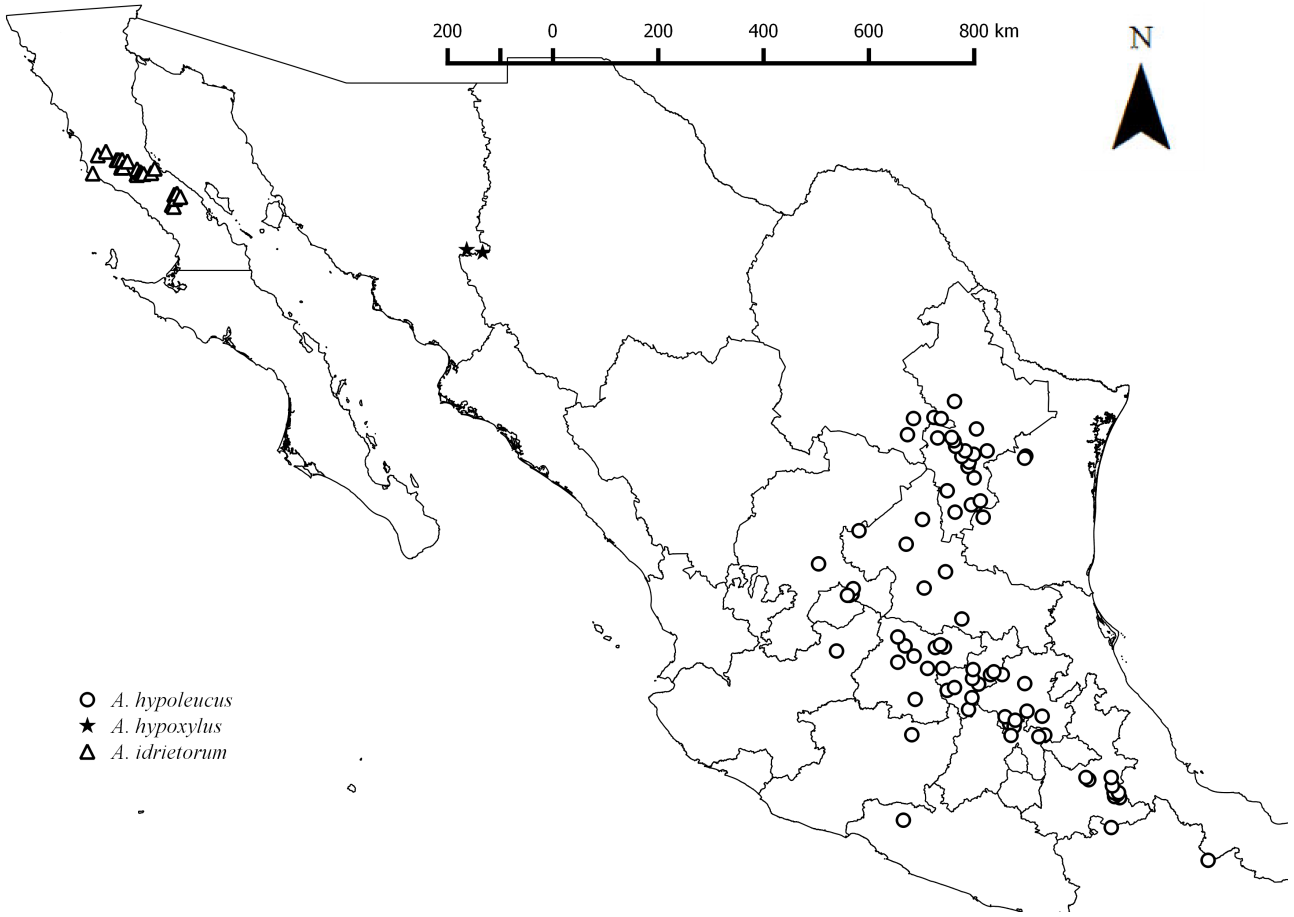

FIGURE 13. Map showing the distribution of *Astragalus hypoleucus, A. hypoxylus,* and *A. idrietorun* in Mexico.

46. *Astragalus hypoxylus* S. Watson, Proc. Amer. Acad. 18. 192. 1883

Type:—USA, Arizona, Maloney's Ranch, in the Huachuca Mountains, Southern Arizona, July 1882, *J. G, Lemmon 2656* (holotype: GH00058776 digital image!; isotype: UC81373 digital image!).

Hamosa hypoxyla (S. Watson) Rydb., Bull. Torrey Bot. Club 54: 336. 1927.

Perennial. Stems subterranean and aereal, the aeral up to 23 cm long, single or branched from near base, decumbent, strigose, cinerose, the trichomes up to 0.2 mm long. **Stipules** 1–1.7 mm long, triangular, not connate. **Leaves** 1.4–5 cm long, leaflets 9–21, 2–12 mm long, narrow oblong to obovate, obtuse to rounded o acute apically, bicolored, abaxially grayish, adaxially pale green and glabrate. **Peduncles** 3.5–7 cm long, thin, deflexed to prostrate; the racemes 0.5–2.5 cm long, compact, rounded, ovoid to oblong, flowers 6–18. **Flowers** white, sometimes the petals with purple tips, lavender, purple or with lilac tones; the calyx 4.8–6.3 × 2–2.1 mm, strigose, the tube 2.6–3.2 mm long, campanulate, sometimes somewhat oblique, the teeth 2–3 mm long, subulate; the banner 7.5–9 mm long, recurved; the wings 6–7.5 × 1.8 mm long, the claw 3–3.2 mm long, the blade 3.5–4 mm long, lanceolate, oblong to obovate; the keel 5.8–6.5 × 1.8 mm long, the claw 3–3.1 mm long, the blade 2.9–3.2 mm long, semi-obovate. **Pod** 5.6–9 × 2–2.5 mm, ascendant, sessile, triquetrous, dorsoventrally compressed, widened, lanceolate to oblong, straight or slightly incurved, basally obtuse, distally contracted in a short terminal beak, lateral angle-rounded, ventrally carinate, dorsally deeply sulcate, the valves strigose, hard-papery with age, ochre or with reddish-purple tones, imperceptibly reticulate, septum complete, thence the pod bilocular or almost so; ovules 6–8; seeds 1.9–2.3 × 1.2–1.7 mm, brown, mitten shape, smooth, shiny.

Distribution:—In Mexico, recorded in mountains of the southeastern Sonora (Yécora), and in the vicinity of Chihuahua, at the height of Bermudez and La Forma. (Fig. 44). Also, in Arizona (USA) (Fig. 13).

Habitat:—Rocky streams; hillsides; grasslands in oak and oak-pine forest; 1500–1556 m.

Comments:—Rare, on the border of Sonora and Chihuahua. This area harbors another six species of *Astragalus* (*A. daleae, A. gentryi, A. nothoxys, A. nuttallianus, A. pringlei* and *A. vaccarum*) with sessile and triquetrous pods. All of them with stems longer than 23 cm. Sometimes abundant in the areas where it is distributed.

Specimens examined:—SONORA: 29 March 1997, Arroyo Agua Caliente (La Soledad), 8 km south of Maycoba on road to Moris (Chihuahua), *T. R. Van Devender 97-420, A. L. Reina G.* (MEXU, USON); 26 May 2004, Cementery in Yécora, *T. R. Van Devender 2004-588, A. L. Reina* (MEXU, NY, USON).

47. *Astragalus idrietorum* Barneby, Shreve & Wiggins, Veg. Fl. Sonoran Des. 1: 703. 1964

Type:—MEXICO, Baja California, 10 miles s. of El Marmol, 6 March 1930, *I. L. Wiggins 4377* (holotype: CAS0027670 digital image!: isotype: GH00059420 digital image!, NY00005804, NA0095612 digital image!, CAS0027669 digital image!).

Perennial, but of short duration. **Stems** up to 40 cm long, single or branched, decumbent or slightly ascending, strigose, the trichomes up to 0.7 mm long, appressed or sub-appressed. **Stipules** 2–4.5 mm long, semi-clasping, not connate, triangular. **Leaves** 3.5–11 cm long; leaflets 11–21, 4–23 mm long, linear, lanceolate, lanceolar-oblong to elliptic, obtuse, mucronate, pubescent in both surfaces, sometimes less dense or glabrate adaxially. **Peduncles** 3–10 cm long, ascendant; the racemes 2–7.5 cm long, flowers 8–22. **Flowers** purple, rose-purple, blue-purple, deep or pale violet, violet with the wings lighter, magenta, turning violet when dry; the calyx 3.8–5.2 × 2–2.9 mm, strigose, trichomes white or white and black mixed, the tube 2.4–3.2 mm long, campanulate or with purple tones, the teeth 1.3–2.2 mm long, subulate to triangular, green to purple; the banner 6.4–9 × 5–7.7 mm, recurved, sometimes in a straight angle (90°), ovate, retuse distally; the wings 5.5–7.9 × 1.8–3.3 mm, the claw 2.2–2.8 mm long, the blade 3.8–4.7 mm long, elliptic to obovate; the keel 5.7–7.4 × 2–2.7 mm, the claw 2.2–3 mm long, the blade 3.8–4.7 mm long, obovate. **Pod** 1.2–2.2 × 0.6–1.3 cm, ascendant, sessile o minute elevated above the receptacle, ovoid to semi-ovoid, inflated bladder-like, basally rounded or wide turbinate, somewhat asymetric, distally contracted in an 3–5 mm long triangular beak, ventrally shallowly sulcate with a flat filiform suture, dorsally similar, but more convex, the valves strigose, pale green or purple tinted, ochre, lustrous, papery y semi-transparent, septum absent; ovules 8–12; seeds 1.5–2.9 mm long, mitten shape, brown, smooth.

Distribution:—Endemic to the Península of Baja California, distributed in its northernmost part from El Aguajito, San Juan de Dios y El Arenoso, through San Vicente, Misión San Fernando, Ramona, San Pablo, Catarina, Esmeralda and Santa Ynés to Colombia, Codornices, El Crucero y Santa Ana, between coordinates 28°59–30°N (Fig. 13).

Habitat:—Saline, sandy, rocky and granitic soils; gravelly desert soils; granitic sands; muddy banls along arroyos; sandy washes; roadside and streams; shallow arroyos in rolling plains; boulders and sandy flats and beds; flat gravelly desert; slopes with desert pavement; associated with boojum, columnar cacti, prickl-pear; also in creosote bush-mesquite and mesquite-wolfberry associations; palm canyons; 400–1000 m.

Comments:—The area where this species occurs harbors another seven species of *Astragalus* such as: *A. acutirostris, A. didymocarpus, A. douglasii* var. *glaberrimus*, *A. insularis* var. *harwoodii, A. nuttallianus* var. *austrinus, A. piscinus* and *A. fastidius*). But only *A. insularis* var. *harwoodii* (racemes with only 3–9 flowers), *A. fastidius, A. piscinus,* and *A. idrietorum,* have rose, purple or violet flowers, and also inflated pods (14–50 mm long), from these three species only *A. piscinus* has stipitate pod. The last two species can be separated based on flower and pod size, and ovules number. *A. piscinus* has larger petals (banner 10–12.9 mm; wings 9.3–11.5 mm; the keel 8.4–9.1 mm long) and also larger pods (avergaing 23–30 mm long), with almost twice the number of ovules (18–25). Locally common on the roadside.

Specimens examined:—BAJA CALIFORNIA: 3 April 1998, Cataviña cantos rodados; California. 5 millas al N de Cataviña y 5.7 millas al O de la autopista 1 a lo largo del camino a Faro San José., *J. Rebman 5009* (BCMEX; SD); 29 March 1985, Along the dirt road to Santa Catarina Landing, 8.5 mi. E of Rancho Sta. Catarina, 9.2 mi. W of Hwy 1 at La Guayaquil, *A. C. Sanders 5528, E Rodríguez* (NY); 7 November 1947, Southern edge of Llano de Buenos Aires, 11 km southeast of San Augustin on road to Cataviña, *A. Carter 1874, A. M. Alexander, L. Kellogg* (JEPS, MEXU, US); 30 May 1973, Along the main road about 5 mi. SE of Rancho San Luiz, about 70 mi. SE of Rosario de Arriba,*R. & M. Spellenberg 3309, H. Wolf, J. Syvertsen* (ENCB, NY); 1 February1973, 7.5 miles south of El Crucero, *R. Moran 19627* (NY, US, SD); 9 November 1950, Sandy arroyo 14.6 km. northwest of San Agustin, *A. Carter 2793, L. Kellogg* (JEPS, MEXU); 16 January 1948, Shallow arroyo on rollig plain, 36 km. south of Cataviná, *A. Carter 2547, A. M. Alexander, L. Kellogg* (JEPS, MEXU); 2 March 1963, Placer de Cota, at west base of Cerro San Luis, *R. Moran 10335, J. Henrickson* (ENCB, NY); 18 March 1984, just N of Cataviéa, *D. E. Breedlove 60775* (CAS); 12 April

1931, 36 miles southeast of Rosario, *I. L. Wiggins 5301* (CAS, TEX-LL); 14 April 1931, Between Laguna Catavina and Laguna Seca Chapala, *I. L. Wiggins 5341* (CAS, NY); 31 May 1965, En el alto Arroyo Alfredo al noroeste de la ex misión Santa María, *R. Moran 12180* (CAS, SD); 24 March 1962, North San Lorenzo Island, called Isla Partida, actually middle of three islands in the group, Gulf of California, *I. L. Wiggins 17261* (CAS); 11 March 1999, 1 km al N de Cataviña sobre la carretera a Tijuana, *J. L. Panero 7406, B. Crozier, S. González, J. I. Calzada* (IEB, NY, TEX-LL); 30 May 1973, In wash, 10 mi S of El Marmol, *I. L. Wiggins 4377* (NY); 18 March 2002, Near Rancho Santa Ynes, *A. L. Reina G. 2002-230, T. R. Van Devender, M. A. Dimmitt, J. F. Wiens, C. Martin* (USON); 12 April 2002, Misión de Santa Maria, *M. Salazar 647* (SD); 27 March 1991, 2 millas al NO de San Agustín, *G. L. Webster 28605* (SD); 23 March 1973, 1.0 milla al norte de San Roques, G. L. Webster 18094, *G. L. Webster 18094, S. Lynch* (SD); 14 April 1954, Catavina, *D. R. Harvey s.n.* (SD); 15 March 1947, El aguila, *C. F. Harbison 41544* (SD); 25 September 1965, Lavado de arena, San Agustín, *B. F. Howe s.n.* (SD); 22 March 1951, 2.0 millas al norte de Catavina, *Brattstrom s.n.* (SD); 18 April 1992, Rocky hills and granitic bolder fields at arroyo Cataviña, at Santa Ines, *M. Merello, D. Brunner 284* (MEXU); 13 December 1977, 39 miles south of El Rosario, 3 miles south of Santa Cecilia on Mex Hwy 1. B. C. Norte, K. C. Nixon, *K. C. Nixon, C. P. Cowan 826* (MEXU); 10 April 1952, 2 to 3 miles north of San Fernando, *H. S: Gentry 11677, W. B. Fox 11677* (MEXU).

48. ***Astragalus insularis*** Kellogg, Bull. Calif. Acad. Sci. 1: 6: 1884

Annual or biennal. **Stems** 1-few, up to 62 cm long, suberect, decumbent to prostrate, strigose, the trichomes up to 0.7 mm long, straight or appressed. **Stipules** 1–5 mm long, semi-clasping, triangular to deltoid, not connate. **Leaves** 2–13 cm long; leaflets 7–21, 3–19 mm long, lanceolate, oblong to elliptic, acute, obtuse or retuse, sometimes arched back, especially evident when folded, equally pubescent on both faces, subglabrate or glabrate. **Peduncles** 0.8–7 cm long, incurved, ascendant; the racemes 0.5–6 cm long, flowers 3–9, horizontal to pendulous. **Flowers** purple-reddish, dark-purple, magenta, blue-violet, blue, sometimes turning violet when dry; the calyx 3.1–4.6 × 1.8–2.3 mm, strigose, the trichomes white and black mixed, the tube 1.6–2.9 mm long, campanulate to sub-turbinate, with purple tones; the teeth 1.3–3 mm long, subulate, the ventral pair the longer; the banner 5.5–7.4 × 3.9–5.3 mm, recurved, distally notched; the wings 5–6.5 × 1.1–2.2 mm, the claw 1.6–2.2 mm long, the blade 3.5–4.7 mm long, oblanceolate to obovate, slightly incurved; the keel 4.8–6 × 1.6–2.1 mm, the claw 1.8–2.4 mm long, the blade 3–3.7 mm long, semi-obovate. **Pod** 0.9–2.4 × 0.5–1.5 cm, spreading to deflexed, sessile o diminutely elevated 0.1 mm above receptacle, ovoid to elliptic, sub-symetric, rarely lanceolate-elliptic or subglobose, inflated bladder-like, scarcely or strongly beaked, beak 2–7 mm long, the valves tan to pale-ochre or sometimes with purple tones, strigose, semi-diaphanous, somewhat lustrous, softly reticulate, septum absent; ovules 12–14; seeds 2.3–3.8 mm long, mitten shape, brown ochre or rose-brown.

Comments:—*Astragalus insularis* physognomically resembles to *A. aridus* and *A. comonduensis*, however *A. aridus* and *A. comonduensis* have ascending pod with 3–9 ovules.

The three infraspecific categories are recognized based on the shape of the pod and the shape and pubescence of the leaflets.

1. Pod sub-symetric, ovoid to subglobose, the beak up to 2.5 mm long, ventral suture equally convex than dorsally one; Baja California (Vicente Guerrero y San Quintín (30°39'N–115°32'W), through El Rosario, to Rosario de Abajo de San Carlos, Santa Catarina and Canoas (29°28'N–115°11'W) ..... **var. *quentinus***
- Pod obliquely ovoid, the beak 2.5–7 mm long, ventral suture prominent, less convex than than dorsally one.....2
2. Stems up to 30 cm long; leaflets acute and mucronate, adaxially glabrate, but few scattered trichomes all over the surface or along midvein abaxially or sometimes densely pubescent abaxially in individuals of Cedros Island; close to the coast (29°17'N–114°49'W), also in the continental mass, through Mina Columbia, Punta Prieta, San Juan, to San Luis (28°20'N–113°20′W), Cedros and San Lorenzo Islands, in west coasts of Baja California Sur, in close proximity to Puerto Nuevo (27°28'N–114°30'W), through San Cristóbal, El Dátil, El Batequi, La Ballena, to San Juanico and Cedros Island (26°15'N.112°34'W)..... ..... **var. *insularis***
- Stems up to 55 cm long; leaflets obtuse or retuse, pubescent in both faces, sometimes adaxially glabrescent; northwest Sonora (San Luis Rio Colorado, Desierto de Altar and areas of El Pinacate, at south along the coast, from Puerto Peñasco, through Álvaro Obregón, Puerto Lobos, Puerto Libertad, Tordilla, Cabo Tepoca to Bahía Kino and San Clemente; south end of California Norte, La Guarda Island (29°21'28''N–114°11'5.4''W), adjacent to San Lorenzo Island, close to Misión San Borja (28°44'36''N–113°45'27.7''W), adjacent to Bahía San Felipe (31°04'33''N–114°51'00'') and Misión Calamajué (29°25'27.8''N–114°11'42''W .... **var. *harwoodii***

48.1. ***Astragalus insularis*** var**.** ***harwoodii*** Munz & McBurney, Bull. S. Calif. Acad. Sci. 31: 66. 1932

Type:—USA, Colorado, Blythe Junction, Colorado Desert, 2 April 1920, *Munz & Harwood 3592* (holotype: RSA0003013: isotype US, not found).

The variety with a larger growth habit and almost always with truncate to retuse leaflets.

Distribution:—Northwestern Sonora (from San Luis Río Colorado, Altar Desert and Pinacate), south along the coast (from Puerto Peñasco, through Álvaro Obregón, Puerto Lobos, Puerto Libertad, Tordilla, Cabo Tepoca to Bahía Kino and San Clemente), in the Gulf of California, on the San Lorenzo Islands, Salsipuedes and Isla Angel de la Guarda. In Baja California, on the eastern coast between San Felipe and Estrella (30°56'–31°01'N), on the peninsula, from the height from San José and Chapala (29°23'N–29°31'N) to Punta Prieta, Juáez, Bachandres (28°50'N–114° 03'W), and the western coast in Baja California Sur, between Santa Maria (27°24'N–112°18'W) and Santa Rosalia (27°20'N–112°18'W). Also, in Arizona and California (USA) (Fig. 14).

Habitat:—Sandy, clayey and granite rock soils; gravelly and rolling sand plains; flood banks; beach sand; coastal plains with low dunes; associated to creosote bush scrub; associated with Joshua tree*,* prickly-pear*,* lomboy blanco*,* saltbush*,*wolfberry*,* creosotebush scrub; bottom of canyon; 1–1100 m.

Specimens examined:—BAJA CALIFORNIA: 22 March 1963, Summit of peak ca. 4 miles 4 miles SE of Refugio Bay, Isla Angel de la Guarda, *R. Moran 10471* (CAS, NY, US); 26 March 1960, 18 miles north of Punta Prieta ½ mile south of road to San Felipe, *D. B. Wiggins 15972-A* (CAS); 17 March 1960, roadside 15 miles north of San Felipe, *I. L. Wiggins, D. B. Wiggins 15786, 15788* (CAS, MEXU); 26 March 1960, 2 miles northeast of junction of Gulf road with western road 20 miles north of Punta Prieta, *I. L. Wiggins, D. B. Wiggins 15960-A* (CAS); 24 March 1962, San Lorenzo Island (southern island), *I. l. Wiggins 17274* (CAS); 20 April 1966, Isla Angel de la Guarda; summit of Cerro Angel, *R. Moran 12922* (CAS, NY, SD); 24 March 1962, North San Lorenzo Island, called Isla Partida, actually middle of three islands in the group, Gulf of California, *I. L. Wiggins 17261* (CAS); 17 March 1977, Isla Angel de la Guarda; en bajada, base oeste del pico, ca. 6.0 km al sureste de Puerto Refugio, *R. Moran 23942* (SD); 15 April 1947, Valle de Agua Amarga, a 15 millas al oeste de la Bahía de Los Ángeles, *C. F. Harbison 41763* (SD); IV-1905, Isla Cedros, *T. S. Brandegee s.n.* (SD); 12 April 1963, 1.2 mile by road (Mex.15) north of Casita. Valley bottom, *R. S. Felger 7219* (MEXU). **BAJA CALIFORNIA SUR:** 1 June 1973, About 10 mi. NW of Santa Rosalia, *R. W. Spellenberg 3327, M. Spellenberg, H. Wolfe, J. Sylvester* (NY); 11 February1984, Desierto de Vizcaino, al E de Bahía Asunción, Mpio. Mulegé, *J. Cancino 19c, C. Plata* (MEXU). **SONORA:** 29 April 1991, Paved highway from Puerto Peñasco to Caborca, ca. 8.5 km northeastward from mouth of Estero Morúa (junction of road to Playa Encanto), *R. S. Felger 91-46* (NY); 27 February1958, Cholla Bay, Punta Peñasco, *P. H. Raven 11674* (NY), Northern limits of Peñasco, *11680* (CAS, NY); 22 March 1978, 29 mi. by road S of Desemboque, about 5 mi. due W of new highway under construction, ca. 3 mi. E of rocky, reddish mountains, *R. & M. Spellenberg 4949* (NY); 16 March 1936, Playa 1 mi. inland from Punta Penasca, *I. L. Wiggins 8383* (CAS); 23 February1935, Along beach 24 miles south of Punta Prieta, *I. L. Wiggins 7740B* (CAS); 7 March 1983, Coast of the Gulf of California near the mouth of the Rio Concepcion, 10.6 miles NE of El Desemboque on the road toward Caborca, *A. C. Sanders 3476, M. Dimmitt, G. Montgomery et al.* (NY); 3 March 1972, *R. S. Felger 20349* (ENCB, SD); 31 March 1988, 8.2 km NE of Arroyo Batamote (crossing) on Mex. Hwy 8 (40 km SW of Sonoyta), *R. S. Felger 88-242* (ENCB); 10 March 1973, ca. 2 miles north of Sierra del Rosario, Gran Desierto, *R. S. Felger 20777* (ENCB).

48.2. ***Astragalus insularis*** Kellogg var**.** ***insularis***

Type:—MEXICO, Baja California, Isla Cedros, 4 June 1877, *J. A. Veatch* (holotype: CAS not found: isotype: CAS0001064 digital image!).

Astragalus insularis Kellog, Bull. Calif. Acad. Sci. 1: 6: 1884.-*Astragalus triflorus* (DC.) A. Gray var. *insularis* (Kellog) M. E. Jones, Proc. Calif. Acad. Sci. II. 5: 637. 1895.—*Phaca insularis* (Kellog) Rydb., N. Amer. Fl. 24: 353. 1929.—*Astragalus insularis* Kellog var. *pondii* M. E. Jones, Rev. N.-Amer. *Astragalus* 104. 1923.

Phaca pondii Rydb., N. Amer. Fl. 24(6): 351. 1929.

Distinctive characters as in the key.

Distribution:—Variety endemic to the peninsula of Baja California. More frequently distributed along the western coast of Baja California, from Mina Columbia (29°19'N) and Punta Prieta (28°57'N–114°09'W), through Los

Tepetates and Las Palomas (central-western portion of peninsula), also on Cedros and San Lorenzo islands. In Baja California Sur along western coast, from San Cristobal (27°24'N–114°30'W), to the south, through de San Pablo, San Roque to El Batequi, San Juan and La Ballena (26°21'N–112°35'W) (Fig. 14).

Habitat:—Volcanic rocks; boulder fields; sandy valleys floors; seasonally flooded valleys; eroding low coastal hills; seasonally; steep ravines; arid scrublands; sacrocaule scrub; rocky slopes with columnar cacti, wolfberry, and prickly-pear; associated with cirio (boojum), creosote bush, jojoba, mezquite, prickly-pear, wolfberry, saltbush, maguey; 6–550 m.

Specimens examined:—BAJA CALIFORNIA:11 March 1998, Desierto de Vizcaino; N de El Arco; N de Calmalli, a lo largo de la carretera entre Rancho Esperanza y Rancho Miramar, *J. Rebman 4867* (BCMEX; SD); 20 March 1966, Rancho Carrizo, *R. Moran 12835* (NY); *3 June 1925,* Cedros Island, *H. L. Mason 1994* (CAS); 24 March 1962, San Lorenzo Island (southern island), Gulf of California *I. L. Wiggins 17274* (CAS, NY); 17 February1962, 9 miles south of Higuera on road from Bahia de los Angeles to San Borja, *I. L. Wiggins 16728* (CAS, MEXU, US); 12 March 1911, Cedros Island, *J. N. Rose 16151* (NY); 18–20 March 1889, Cedros Island, *E. Palmer 685* (NY); 25 February1935, 2 miles east of Rancho Mesquital, *F. Shreve 6961* (CAS); 19 March 2010, 24 km NW by air from turn off of Highway 1 to Bahia de los Angeles, *B. T. Wilder 10-119, J. P. Rebman, I. Andrew Happle, S. I. Enciso* (CAS, USON, SD); 1 March 1985, 10–20 km N or Puerto Santa Catarina on road to Rancho Santa Catarina, *D. E. Breedlove 62276* (CAS, MEXU, NY, TEX-LL); 26 February1986, Near Punta Canoas, *D. E. Breedlove 62490* (CAS, ENCB, MEXU, NY, TEX-LL); 1 May 1970, 7 miles north of Jaraguay, *R. R. Humphrey 2070* (CAS, ENCB); 20 March 1960, 18 miles north of Punta Prieta ½ mile south of road to San Felipe, *I. L. Wiggins 15972-A, D. B. Wiggins* (NY); 18 March 1939, Canyon southeast of Mount Cerros, Cedros Island, *A. L. Haines n.n, G. Hale* (CAS, MEXU, NY, SD, TEX-LL); 20 March 1966, 10 miles north of San Borja, *R. V. Moran 7960* (NY); 24 March 1962, cerca del extremo S de la isla N San Lorenzo, *R. Moran 8881* (SD); 15 April 1963, Isla Cedros, NO del pueblo de Cedros, camino a la primavera, *R. Moran 10619* (SD); VIII-1931, Isla Cedros, *G. Fleming n.n* (SD); 21 July 1939, Isla Cedros, *L. M. Walker, n.n* (SD); 30 March 1978, Isla Cedros; Cañon Grande, *R. Moran 25422* (SD); 16 April 1963, Isla Cedros; en el lecho del arroyo en medio de la costa este, *R. Moran 10685* (SD); 21 July 1980, Isla Cedros, cerca del aeródromo al sur del pueblo, *R. Moran 29066* (SD); 24 March 1962, Lado suroeste de la isla sur de San Lorenzo, *R. Moran 8900* (NY, SD); 12 April 1983, Isla Cedros, lavar al norte de la ciudad, *T. Oberbauer s.n., H. & E. Wier* (SD); 28 April 1987, 14 Km al SW de Cataviña, por la carr. Transpeninsular, *P. Tenorio L. 13128, C. Romero de T.* (CFNL, MEXU); 7 April 1973, 5–6 miles S. of road to Bahia Los Angeles alog road to Mission San Borja, *H. S. Gentry 23164* (MEXU); 1 May 1987, Rancho El Potrero, 40 km al SW de el Observatorio de San Pedro Martir, *P. Tenorio L. 13224, C. Romero de T.* (MEXU); 30 March 1977, C. 43 mi S of Cataviña, *G. L. Webster 21716* (MEXU); 20 April 1987, San Roque, *P. Tenorio L. 12941, C. Romero de T.* (MEXU); 26 March 1970, ocassional in arroyo bed, ammonite area, Arroyo Santa Catarina, 5 miles N of the mouth, *R. Moran 16939* (ENCB); 27 February 1987, 8 km on Mex Hwy 8 north of Puerto Peñasco, at road junction to Bahia de La Choya, *R. Felger 87-21* (MEXU). **BAJA CALIFORNIA SUR:** 14 February1973, Arroyo San José, *R. Moran 20132, J. L. Reveal* (NY, US, SD); 5 February1972?, Arroyo 3 miles SE of San Andrés, *R. Moran 19798* (NY, US); 24 April 1989, Vizcaino Desert, plain S of Mesa Punta de Auras, 5 miles N of Bahia Asuncion on rd to San Jose del Castro, *S. 3480, T. Ross, L. Arnseth* (MEXU, NY); 26 March 1982, Pacific slope of Sierra de Placeros 35 km SE of Bahia Tortugas, *D. E. Breedlove 60941*(NY); 7 March 1985, 35 km SE of Bahia Tortugas, pacific slope of Sierra de Placeros, *D. E. Breedlove 62318* (CAS, MEXU, NY, TEX-LL); 13 March 1911, San Bartolomé Bay, *J. N. Rose 16195* (NY); 14 March 1911, San Bartolomé Bay, *J. N. Rose 16904* (NY); 31 March 1978, Long trail above old copper mine, Cedros Island, *V. Yadon 20* (CAS); 21–23 March 1947, Las Tinajas and vicinity in cerros east of Los Picachos de Santa Clara, *H. S. Gentry 7576* (CAS); 10–15 March 1947, Eastern bajada of Sierra Calvario, Systema de Sierra Viscaino, *H. S. Gentry 7514* (CAS); 3 June 1925, Cedros Island, *H. L. Mason 1994* (CAS); 26 March 1984, Pacific slope of Sierra de Placeros 35 km SE of Bahia Tortugas, *D. E. Breedlove 60941A* (CAS); 24 April 1989, Vizcaino Desert, plain S of Mesa Punta de Auras, 5 miles N of Bahia Asuncion on rd to San Jose del Castro, *S. D. Boyd 3480* (NY); 26 June 1983, Desierto del Vizcaino, Arroyo San José de Casssssstro, Mpio. Mulegé, *J. Cancino H. 12* (MEXU); 24 June 1977, Aguaje vargas, Isla Cedros, *L.M. Villarreal P. 10628* (ENCB); 23 April 1973, Cerro Pedregoso, El Mezquital, a orilla de la carretera, *C. L. Díaz 4155* (ENCB). 21 April 1987, 12 Km al NE de Bahía Tortugas, brecha a Viscaino, *P. Tenorio L. 12982. C. Romero de T.* (MEXU); III June 1897, Cedros Island, *A. W. Anthony 303* (CAS, MEXU, NY, SD).

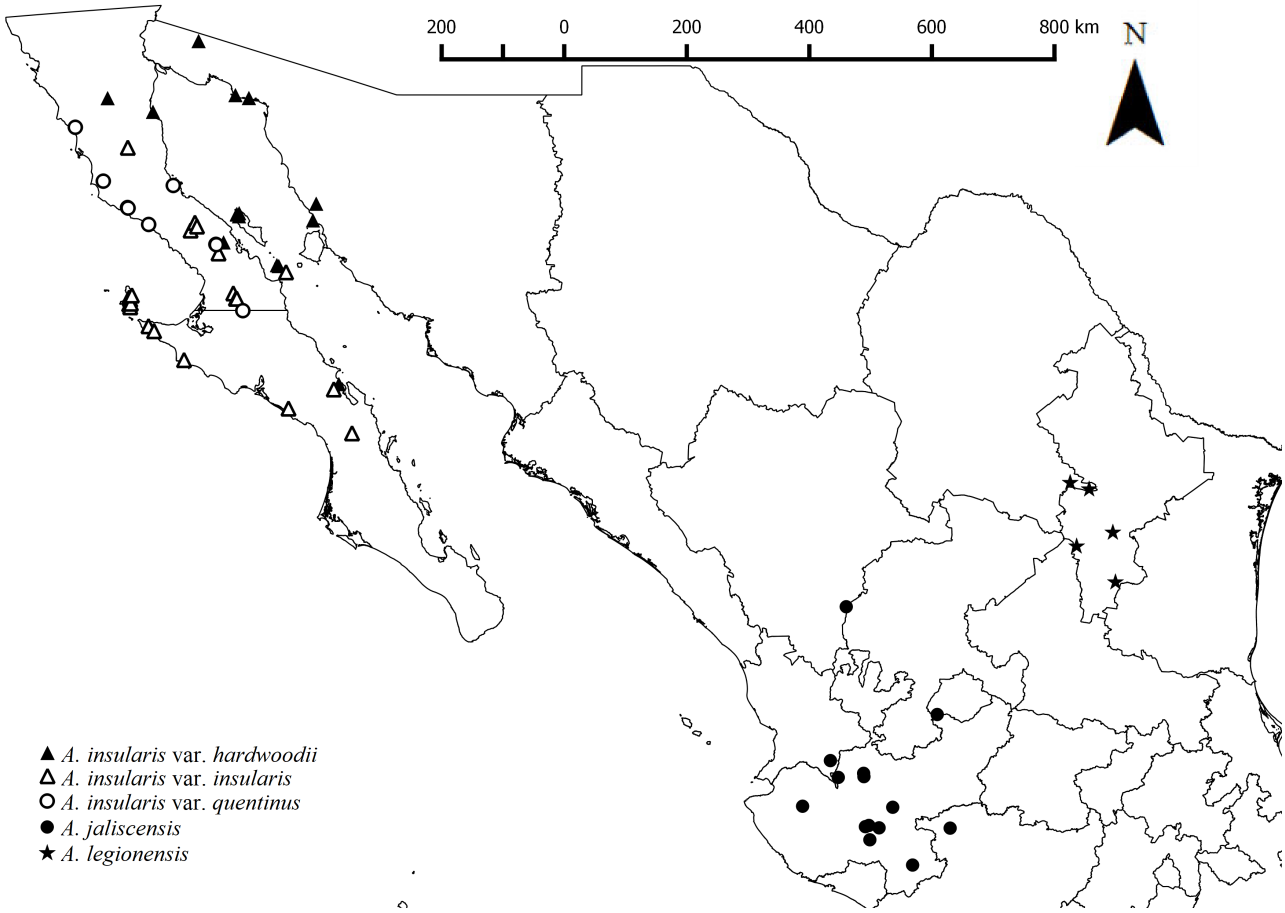

FIGURE 14. Map showing the distribution of *Astragalus insularis* var. *insularis, A. insularis* var. *hardwoodii, A. insularis* var. *quentinus, A. jalicensis* and *A. legionensis* in Mexico.

48.3. ***Astragalus insularis*** Kellog var ***quentinus*** M. E. Jones, Contr. W. Bot. 8: 6. 1898

Type:—MEXICO, Baja California, San Quintin, 12 April 1886, *Orcutt 1327* (holotype: BM000931689 digital image!: isotype: NY00005805!).

This variety has a localized geographical distribution.

Distribution:—Endemic to Baja California, it is distributed from Vicente Guerrero and San Quintín (30°39'N–115°32'W) south to San Carlos, Santa Catarina and Canoas (29°28'N–115°11'W) (Fig. 14).

Habitats:—Silty soils with rocks; canyons along washes; dunes; slopes near roads; along beds of dry streams; slopes, next to intermittent streams, with *Fouquieria, Pachycormus, Machaerocereus, Opuntia, Atriplex, Larrea, Trixis, Lophocereus, Yucca, Salvia, Solanum*; coastal scrub; 180–210 m.

Specimens examined:—BAJA CALIFORNIA: 4 April 1998, Ca 0.6 millas S del camino a Bahía de los Ángeles y aprox. 17 millas al este de El Crucero y su cruce con la autopista 1, *J. Rebman 5028* (BCMEX, SD); 9 April 1931, Norte Socoro canyon from sign post to beach, *I. L. Wiggins 5217* (CAS); 29 March 1984, Ammonite Canyon at its junction with Arroyo Santa Catarina, 5.4 miles E of Santa Catarina Landing on the road to Rancho Santa C, *A. C. Sanders 5555, E. Rodriguez, J. West et al.* (NY); 10 April 1931, Rosario Wash, *I. L. Wiggins 5244* (CAS, NY); *I-1889,* San Quentin Bay, *E. Palmer 719* (CAS, NY); 24 February1938, Norte Camp 2 mi. S. of Mesquital, *I. L. Wiggins 7767* (CAS); 10 January 1976, Highway 1 2 km south of San Martin, *D. Johnson 149* (CAS); 22 April 1886, Plains near San Quentin bay, *C. R. Orcutt 1327* (NY); 23 March 1970, Arroyo el Cuervito, cerca de la boca, *R. Moran 17088* (SD).

49. ***Astragalus jaliscensis*** (Rydb.) Barneby, Mem. New York Bot. Gard. 13: 167–168. 1964

Type:—MEXICO, Jalisco, Sierra de Tequila, 5 July 1893, *C. G. Pringle 4430* (holotype: (based on *Atelophragma jaliscense*): isotype: P00585283 digital image!, P00585385 digital image!, P00585384 digital image!, G00441214 digital image!

Atelophragma jaliscense Rydb., Bull. Torrey Bot. Club 55: 157. 1928.

Perennial. Stems up to 60 cm long, suberect to decumbent, trichomes up to 0.5 mm long, straight to appressed. **Stipules** 3–5.5 mm long, the lowest ones clasping and connate for a half or little more, forming a bidentate sheath, the upper ones lanceolate, almost free to the base. **Leaves** 3–7 cm long; leaflets 19–29, 3–14 mm long, ovate, elliptic to suborbicular, obtuse to retuse, thin, adaxially glabrate, rarely with few scattered trichomes, abaxially subglabrous. **Peduncles** 8–16 cm long, ascendant; the racemes 5–10 cm long, flowers 12–25. **Flowers** ochroleucous (pale yellow); the calyx 5–5.5 × 2.8 mm, strigose, frequently with black trichomes, the tube 2.8–3.5 mm long, campanulate, the teeth 1.5–2.8 mm long, subulates; the banner 10–11.2 × 4.5–5 mm, recurved, obovate, basally cuneate; the wings 10–10.5 × 1.9 mm, the claw 4–4.5 mm long, the blade 5.9–7.5 mm long, oblong to obovate; the keel 8.5 × 2.4 mm, the claw 4–4.2 mm long, the blade 4.8 mm long, obovate. **Pod** deflexed, stipitate (stipe 3–4 mm long), the body oblong to oblong-elliptic or clavate, dorsoventrally flattened, 2–3.9 × 0.6–0.8 cm, straight or rarely slightly curved, basally gradually narrowing in a stipe, distally contracted and ending in a small beak, ventrally rounded, dorsally flattened or openly and shallowly sulcate, the valves glabrate, ochre, papery, septum incomplete, 0.3–0.9 mm wide, pale brown or black fruit stages in the same plant; ovules 22–24; seeds 1.8 mm long, mitten shape, brown to dark brown.

Distribution:—Endemic to Mexico. Mainly distributed in Jalisco, Michoacán and Nayarit, with several northern records for Durango (Súchil) and one for Aguascalientes (Fig. 14).

Habitat:—Volcanic soils, rocky hillsides; oak forest; oak-pine forest; pine forest with *Arbutus*; oak-cypress forest; 1450–2950 m.

Comments:—In the area of distribution of this species, especially in Jalisco, *A. guatemalensis* var. *brevidentatus* also occurs. Both species are morphologically very similar, and it is very difficult, if not impossible to find another character that is not the fruit to discern between these two taxa. The most obvious character of the pod is its width to length relationship, but even these measures sometimes overlap in some areas where their distributions converge.

Specimens examined:—AGUASCALIENTES: 26 August 1960/28 August 1960, Sierra del Laurel, near the Jalisco-Aguascalientes border, ca. 10 miles southeast of Calvillo (3 hours by horse from Rancho de los Adobes), *R. McVaugh 18468, C. Feddema, R. W. Pippen* (IBUG, MEXU, NY). **DURANGO:** 6 August 1981, Al S de San Juan de Michis, *S. González 1819, S. Acevedo* (ANSM, CIIDIR, ENCB, IEB, MEXU, NY). **JALISCO:** 5 June 1982, 25 km después del entronque, carretera Pihuamo-Tecalitlán, brechaa Jilotlán de los Dolores, *F. J. Santana M. 1061* (IBUG, MEXU); 25 August 1986, Cima del volcan de Tequila, *L. M. V. de Puga 13109* (ANSM, ENCB, IBUG, IEB, MEXU); 5 October 1985, N side of Vulcan Tequila, 17.4 km S Tequila on the road to the microwave station, *B. M. Bartholomew 2706, R. L. Landrum, H. W. Li, T. S. Ying* (MEXU, NY); 13 July 1971, Cerro de Tequila, *J. R. González T. 216* (ENCB, MEXU, NY, SD); 11 January 1987, Volcan Tequila, 5 miles S of Tequila, *A. Liston 635-4, O. R. Dorado, D. M. Arias, M. de J. Cadaxiallyaro* (NY); 28 June 1972, Volcán Tequila, *G. L. Webster 17146, S. Lynch* (MEXU, NY); 23 October 1970, Volcan Tequila, along road to microwave station, *G. L. Webster 15847* (MEXU, NY); 7 November 1994, 14–18 km southwest of Tequila on Volcán de Tequila, *D. E. Breedlove 39234* (ENCB, MEXU, NY); 11 October 1975, Near the mocrowave towers atop Volcán Tequila south of Tequila, 13 miles south of México Highway 15 and 11 miles south of the railroad in Tequila, *J. L. Reveal 4099, R. M. Harley* (MEXU, NY, TEX-LL); 22 July 2000, Brecha a La Cienega a los Picachito, Sierra de Quila, *J. A. Machuca, M. Cházaro B 8453* (IBUG, MEXU); 12 June 1966, Cerro San Juan Cosalá, *L. M. V. Puga 432* (ENCB, IBUG, IEB, MEXU); 27 August 1987, brecha Tapalpa-Chuquilistlán, *A. Rodríguez C. 983, J. Suárez J.* (ENCB, IBUG, MEXU25 June 1987, Km 7 de la brecha que conduce a la estación de microondas Cerro de Tequila, Mpio. Tequila, *A. Rodríguez C. 865, J. Suárez J.* (ENCB, IBUG); 12 June 1986, Cerro de Tequila, *Ramírez P. 35* (IBUG); 1 August 1968, Cerro de Tequila, Mpio. Tequila, *L. M. Villarreal P. 1648* (IBUG); 18 June 1990, Mpio. Tequila, km 10 de la brecha a microondas del Cerro de tequila, *R. Ramírez D., R. G. Tamayo 2091* (IBUG); 1 December 1985, Volcán de Tequila, Mpio. Tequila, *S. Zamudio 12950, Puga et al.* (IBUG); 29 June 1980, km 68 carr. a Talpa, *J.A. Solís M. 2382* (MEXU); 7 November 1993, Puente Salsipuedes entre los límites de los estados de Jalisco y Nayarit, 25 km al SE de Ixtlan, *L. Rico, G. Flores, J.I. Calzada 1199b* (MEXU); 29 June 1981, a ± 14 km al S de Tapalpa, camino a Venustiano Carranza, *J. A. S. Magallanes 2911* (MEXU); 2 November 1960, Steep mountainsides above Amacueca, near the summit of the plateau, road to Tapalpa, *R. McVaugh 20624* (MEXU); 11 October 1975, Near the mocrowave towers atop Volcán Tequila south of Tequila, 13 miles south of México Highway 15 and 11 miles south of the railroad in Tequila, *L. L. Revel 4099* (MEXU); 11 August 1968, *W. R. Anderson 5117,*

Volcan tequila, due south of Tequila, *Ch. Anderson* (ENCB); 12 December 1982, Mpio. Cuautitlán, El Almeal, *C. Sánchez A. s.n., E. Hernández X.* (ENCB); 9 September 1983, Cima del Volcán de Tequila, Mpio. Tequila, *J. A. Pérez de la R. 407* (IBUG). **MICHOACÁN:** 9 September 1989, *L. Torres 394* (IEB). **NAYARIT:** 15 April 2001, Lo de Marcos, *A. Guerra s.n.* (IBUG).

50. *Astragalus legionensis* Barneby, Mem. New York Bot. Gard. 13: 156. 1964

Type:—MEXICO, Nuevo León, ascent to Sierra Infiernillo and Cerro El Viejo, Sierra Madre Occidental (wrong, is S. M. Oriental), 6 June 1934, *C. H. & M. T. Muller 823.* (holotype: MICH1107114 digital image!; isotype: TEX-LL00371238 digital image!, GH00059421 digital image!).

Perennial. Stems dwarf, 2–7 cm long, hirsute, the trichomes up to 0.8 mm long, straight, lax ascendant. **Stipules** 0.6–9.5 mm long, the lowest ones attached almost all its length, forming a triangular, bidentate sheath apically, the upper ones connate, attached almost half of its length. **Leaves** 1.5–6.5 cm long, leaflets 9–27, 0.8–6.5 mm long, oblong, elliptic to obovate, retuse, rarely subtruncate, adaxially glabrate or almost so. **Peduncles** 1–5 cm long, ascendant; the racemes 1.5–10 mm long, flowers 2–5, early ascendant or spreading but soon deflexed. **Flowers** purple to purple-violet; the calyx 6.2–7.9 × 2.3–3 mm, densely hirsute, mainly with black trichomes and few white ones, the tube 3.2–3.5 mm long campanulate; the teeth 2.6–4.4 mm long, lanceolate to subulate, sinus obtuse among teeth; the banner 9.2–14 × 5.6–6.2 mm, obovate to rhombic, recurved, shallowly retuse; the wings 9–12.2 × 1.8–3.5 mm, the claw 3.5–4.2 mm long, the blade 6.5–8.8 mm long, oblong, oblanceolate to obovate, incurved; the keel 7.3–8.5 × 2.2–2.5 mm, the claw 3.7–4.5 mm long, the blade 4–4.4 mm long, semi-obovate, abruptly incurved distally. **Pod** pendulous, stipitate (stipe 2–4 mm long) oblong to elliptic, 14–15 × 3–4.5 mm, recurved, obcompressed, dorsoventrally compressed, ventrally slightly carinate, dorsally flattened and shallow and openly grooved, the valves thin, glabrate, papery with age, ochre or black (remaninig in the peduncles of the past season) with other (in different peduncle), light brown of the present season together, septum complete, the pod thence bilocular; ovules 8–12; seeds not seen.

Distribution:—Endemic to Mexico; mountains of the state of Coahuila (Cerro La Viga, Arteaga) and Nuevo León (Cerro El Infiernillo, Galeana and Cerro El Viejo, Zaragoza) (Fig. 14).

Habitat:—Rare, rocky summit; in pine-oak forest; *Pinus, Quercus, Juniper* forest; associations of Joshua tree, sotol, maguey, sumac; roadside; pine-douglas fir-fir association; 2000–3380 m.

Comments:—The mountainous areas and portions of the High Plains in the central region of the geopolitical border between Coahuila and Nuevo Léon, houses 13 species of *Astragalus*, but this species is easily separated from the others by its stipitate but flattened or obcompressed pod.

Specimens examined:—COAHUILA: 2 October 1982, On the road to the top of Cerro de la Viga, about 30 km east of Hwy 57, *J. Grimes 2291, K. Nixon, S. Sundberg* (NY); 23 June 1985, Sierra El Coahuilón, Mpio. Arteaga, *Hinton et al. 18871* (IEB). **NUEVO LEÓN:** 29 June 1934, Mt. "El Infernillo", Pablillo, southeast of Galeana. Sierra Madre Oriental, *F. W. Pennell 17125* (US), *17130* (NY, US); 18 May 1978, San Antonio Peña Nevada, *Hinton 17328* (ENCB, IEB); 24 March 1985, El Carrizo, *G.L Nesom 18800* (MEXU); 25 June 1978, Picacho San Onofre, Mpio. Zaragoza, *Hinton et al. 17382* (MEXU).

51. *Astragalus lentiginosus* Douglas, Fl. Bor.-Amer. 1(3): 151. 1831

Phaca lentiginosa (Douglas) Piper, Contr. U. S. Natl. Herb. 11: 368. 1906.—*Tragacantha lentiginosa* (Douglas) Kuntze, Revis. Gen. Pl. 2: 946. 1891.—*Cystium lentiginosum* (Douglas) Rydb., Bull. Torrey Bot. Club 40: 50. 1913.

Annual, biennal or perennial. **Stems** up to 1 m long, single or several from base, prostrate, subrect to erect. **Stipules** semi-clasping or clasping and decurrent, not connate. **Leaves** 1–17 cm long, leaflets 11–29, rarely 7. **Peduncles** 1–10 cm long; the racemes subumbelate or in lax racemes, flowers 3–48. **Flowers** purple, rose-purple, red-purple, occasionally dark blue when drying; the calyx 3.7–11.9 × 2.5–3.7 mm, the tube 4–7 mm long, cylindrical, campanulate mainly with black trichomes, sometimes densely so, that the tube is black colored, the teeth short, subulate to triangular mainly with black trichomes; the banner 12–14.8 mm long, ovate, basally cuneate, recurved; the wings 11.2–16.6 × 2.5–3.2 mm, the claw 3.9–6.5 mm, the blade 7.4–11 mm, narrow oblanceolate, oblong to linear; the keel 6–16.2 mm long, obovate. **Pod** 1.2–2.3 cm, sessile, soon caducous, ovoid or globose, inflated, sometimes lanceolate, crescentic or incurved, slightly or not inflated, frequently wide open dorsally, distally curved and ending in a triangular shot or long

beak, the valves papery, leathery or papery but slightly stiff-membranous, glabrate or pubescent, septum complete, the pod thence bilocular; ovules 10–23; seeds brown, brown-orange, with purple or purple-black spots, smooth, opaque, rarely lustrous.

Comments:—Several species of *Astragalus* with with pink, purple, lilac or reddish-lilac or even white with purple, pink or lavender tones flowers and sessile and inflated pods are distributed along the Sonora- Chihuahua border. Some of them have flowers relatively large (banner 7.8 mm long or longer), *A. allochrous, A. magdalenae, A. mollissimus* and *A. sabulonum,* and they are morphologically similar and share multiple features in common to *A. lentiginosus,* but can be differentiated by particular characteristics. *Astragalus mollissimus* is distinguished from those by its broadened (non-inflated bladder-shaped) and relatively small (9–15 mm long, 4–9 mm wide) pods. *Astragalus allochrous* and *A. magdalenae* have smaller flowers (banner 7.8–11 mm long, wider wings, 2–3.6 mm, and the smaller keel, 6.2–9.6 mm long).

Polymorphic species, with 36 varieites (Barneby, 1964), only two of them are present in northwestern Mexico (Chihuahua and Sonora), and essentially distinguished by the pod shape.

1. Pod 12–22 × 5–15 mm, at least twice as long as wide, slight to strongly inflated, globose to ovoid; northwestern extreme of Chihuahua (Janos) ..... ***A. l.* var. *australis***
- Pod 15–23 × 4.5–6 mm, several times longer than wide, lanceolate or narrowly ovate and acuminate; extreme northeast, northwest and central-northern Sonora ..... ***A. l.* var. *borreganus***

51.1. *Astragalus lentiginosus* Douglas var. ***australis*** Barneby, Leafl. West. Bot. 4: 117. tab III, fig. 15–19. 1945

Type:—USA, Arizona, Pima County, along roadside near Robles, west side of the Baboquivari Mountains, *A. Nelson & R. Nelson 1537* (holotype: NY00005501!; isotype: UC, not found), Main characters as in the key.

Distribution:—Northwestern end of Chihuahua (Janos), rare. Sandy soils along roads; desert scrub with *Larrea* and *Yucca.* Also, in Arizona and New Mexico (USA) (Fig. 15).

Specimens examined:—CHIHUAHUA: 4 March 1997, 43 mi. SW of Palomas at minera Bismark turnoff, *N. D. Atwood, 21591, J. Spencer* (NY).

51.2. *Astragalus lentiginosus* Douglas var**. *borreganus*** M. E. Jones, Contr. W. Bot. 8: 3. 1898

Type:—USA, California, Borregos Springs, southeastern California, 16 April 1895, *T. S. Brandegee* (holotype: UC81347 digital image!; isotype: POM, not found).

Astragalus coulteri Benth., Pl. Hartw. 307. 1848.—*Tragacantha coulteri* Kuntze, Revis. Gen. Pl. 2: 944. 1891.—*Astragalus lentiginosus* var. *coulteri* M. E. Jones, Contr. W. Bot. 8: 4. 1898.—*Cystium coulteri* Rydb., Bull. Torrey Bot. Club 40: 50. 1913.

Distribution:—In Mexico, recorded in Sonora, in northwestern (San Luis Río Colorado and Golfo de Santa Clara), northeastern (San Fernando Ranch and Peñasquito), and in the central-northern area (Agua Prieta, Santa Ana and Magdalena). Also reported for the Peninsula of Baja California (Wiggins, 1980; samples not seen). Also in California (Fig. 15).

Habitat:—Desert plains; sandy and gravelly soils; disturbed areas; associated with *Larrea, Ephedra, Hesperocallis, Encelia, Opuntia, Hilaria, Ambrosia, Aristida, Oenothera, Typha, Ambrosia,* and *Tamarix*; 30–700 m.

Speciemns examined:—BAJA CALIFORNIA: (reported by Wiggins, 1980, material no observed). **SONORA:** 26 February1958, Along Mexican Highway 2, 3.5 miles south-east of San Luis, *P. H. Raven 11637* (CAS, NY); II-1904, La Grulla near to Intl. boundary, *D. T. MacDugal, s.n.* (NY); 4 March 1992, 5 March 1992, Ca. 9 airline km NNE of El Golfo de Sannta Clara, *R. S. Felger, 92-181, K. Cliffton* (CAS, MEXU); 4 March 1992, 9 km on Mex Hwy 2 east of center of San Luis, Rio Colorado, *R. S. Felger 92-163, K. Cliffton* (CAS, NY, SD); 6 March 1992, Ca. 14 airline km NNW of El Golfo de Santa Clara, at 3 km by road east of the El Golfo highway (Son 40) on the road to Tornillal and La Salina, *R. S Felger 92-220, K. Cliffton* (MEXU, NY); 6 March 1992, 10 km by road northeast of Sanchez Islas (abandoned RR mainentence station), NE of El Golfo de Santa Clara, *R. S Felger 92-215, K. Cliffton* (MEXU; 13 March 2010, Sonoran Desert, ca. 7 km E of San Luis Río Colorado, *B. T. Wilder 10-02, E. Ezcurra, P. Dayton, A. Martínez-B., N. Pietrasiak, L. Weller* (USON, SD); 4 March 1992, 9 km on Mex Hwy 2 east of center of San Luis Río

Colorado, *R. S Felger 92-163, K. Cliffton* (MEXU); 12 March 1993, San Luis Río Colorado, east side of the city, ca. 2 km east of college (CESUES),*R. S Felger 93-210, D. O Reina* (MEXU); 23 March 1993, Delta Region of the Rio Colorado. Santa Clara Slough*, D. O. Reyna s.n.* (MEXU).

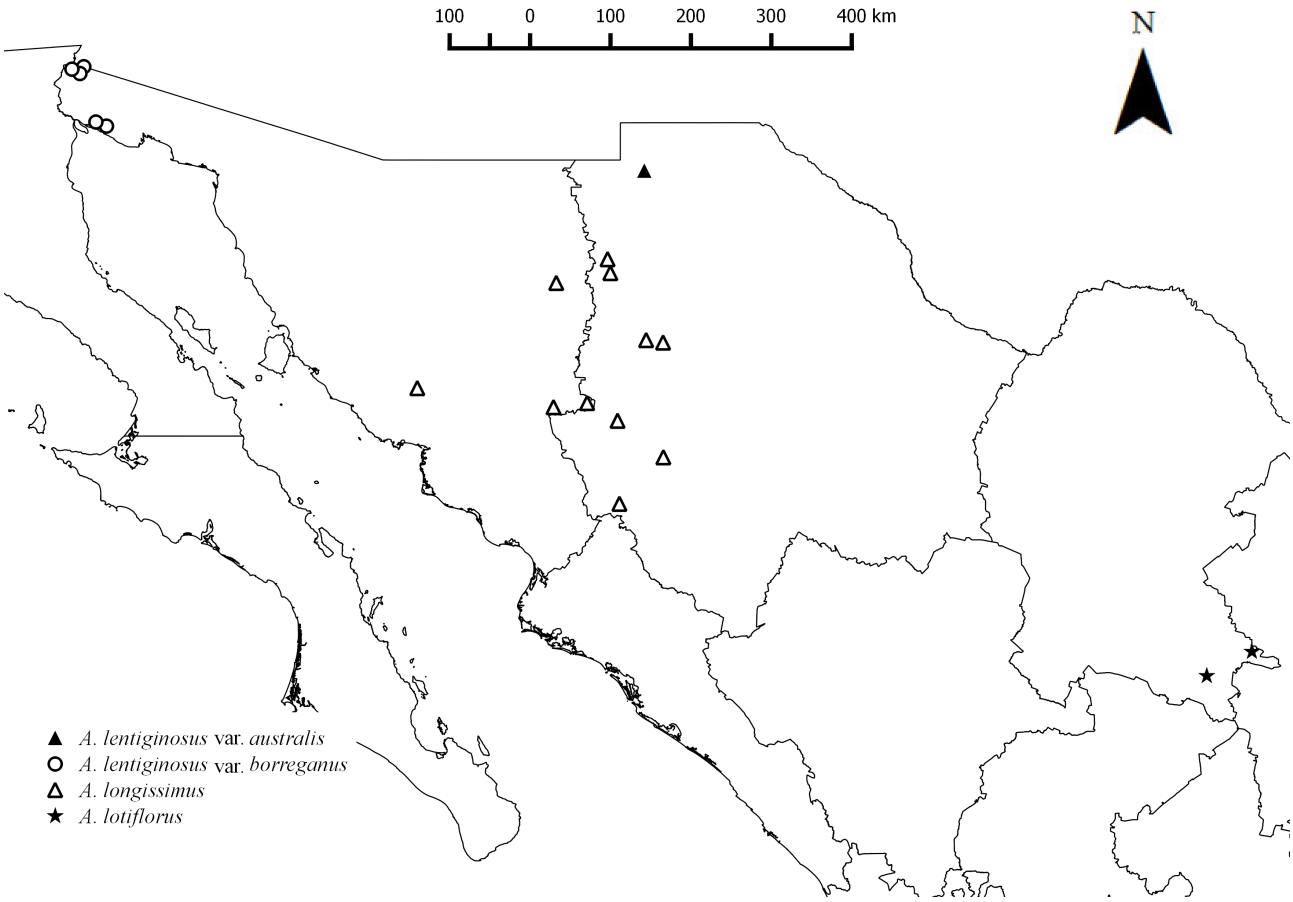

FIGURE 15. Map showing the distribution of *Astragalus lentiginosus* var. *australis, A. lentiginosus* var. *borreganus, A. longissimus,* and *A. lotiflorus* in Mexico.

52. *Astragalus longissimus* (M. E. Jones) Barneby, Mem. New York Bot. Gard. 13(1): 183. 1964

Type:—MEXICO, Chihuahua, by streams of the Sierra Madre, *C. G. Pringle 1219* (holotype (based on *Astragalus rusbyi* var. *longissimus*): US00831412 digital image!; isotype: NDG26787 digital image!, PH00005547 digital image!, F0058947F digital image!, NY00005838!, NY00005839!; isosyntype: NA0095601 digital image!)

Astragalus rusbyi Greene var. *longissimus* M. E. Jones, Proc. Calif. Acad. Sci. ser. 2, 5: 662. 1895.—*Atelophragma longissimum* Rydb., Bull. Torrey Bot. Club 55: 162. 1928.

Atelophragma townsendii Rydb., Bull. Torrey Bot. Club 55: 163. 1928.

Perennial. Stems up to 40 cm long, hard o thin but hard, single o several branched form base, ascendant or erect, pubescent, the trichomes up to 1 mm long, sub-appressed or ascending or almost so. **Stipules** 1.5–8 mm long, clasping to connate, the lowest ones bidentate, forming a sheath around the stem, the upper ones lanceolate or just attached or connate at base only, sometimes free. **Leaves** 5–15 cm long; leaflets 23–45, 2–14.4 mm long, linear, elliptic to obovate, obtuse or mucronate, adaxially glabrate or subglabrate in midvein or adjacent to it. **Peduncles** 5–22 cm long, straight o curved, ascendant; the racemes 5–31 cm long, lax, flowers 13–75 pendulous. **Flowers** ochroleucous, turning opaque-yellow when drying, yellow and white, yellowish; clear yellow, the keel paler; the calyx 3.2–5 × 2.1–3.2 mm, strigose, trichomes black o black and white mixed, the tube 2.4–3.5 mm long; the teeth 0.8–1.6 mm long, subulate or triangular, sometimes one pair shorter and wider; the banner 5.2–8.3 mm × 3.2–5.6 mm, ovate, basally cuneate, recurved, slightly retuse apically; the wings 5.4–8.5 mm × 1.5–2.6 mm, the claw 2–3.5 mm long, the blade 3.7–5.5 mm long, oblong or obovate, incurved; the keel 4.4–6.6 x 1.7–2.5 mm, the claw 2.1–2.8 mm long, the blade 2.8–4 mm long, obovate. **Pod**

deflexed, 13–23.2 × 4–5.2 mm, stipitate (stipe 3–5.5 mm long) oblong, elliptic, to lancoelate, straight o slightly curved, narrowed at both ends, triquetrous, obcompressed, ventrally carinate, dorsally open and slightly sulcate, laterally lightly convex, the angles obtuse, the valves somewhat fleshy, greenish, ochre or bronze with age, rigid papery, softly reticulate, septum partial or complete, the pod thence bilocular or subbilocular; seeds 2–2.5 mm long, mitten shaped, purple or brown.

Distribution:—Endemic to Mexico; retricted to the mountains in northwestern Mexico, Sonora and Chihuahua (Fig. 15).

Habitat:—Volcanic, gray, rhyolitic soils; pronounced slopes; rocky slopes; cultivated areas; open oak forests; pine-oak forest; coniferous forest with *Pseudotsuga*; disturbed grasslands; 2225–2400 m.

Comments:—The mountains, hills and high plains of northeastern and southwestern Chihuahua adjacent to Sonora harbor at least 15 different *Astragalus* species, but only four of them have yellow, pale-yellow, lemon-yellow to green-white (*A. daleae, A. giganteus, A. hartmanii* and *A. longissimus*). Only *A. daleae* and *A. longissimus* have triquetrous pods, but *A. daleae* has cimbiform (boat-shaped) stipules and relatively short, 7–12 mm long and sessile pod.

Specimens examined:—CHIHUAHUA: VIII-1899, Between Colonia Garcia and Pratt's Ranch below Pacheco, *E. W. Nelson 6283* (NY); 17 August 1959, Along railroad tracks between Cuatrocientos and Las Barras de Babicora, *A. R. Kruckeberg 4941* (NY); 2 August 1988, 4 mi. E of Ocampo, *R. Spellenberg 9651* (NY); 21 October 1968, Between Sta. Ana Babicora and Bachiniva near Sta. Ana Babicora, about 2 mi. w of the summit, *R. Spellenberg 2003, M. Spellenberg* (NY); 21 October 1968, Between Sta. Ana Babicora and Bachiniva near Sta. Ana Babicora, about 1 mi. w of the summit, *R. W. Spellenberg 2005* (NY); 2 August 1988, On Chih. Hwy. 28 at the top of the Cuesta del Toro, 22 km N of Soto Maynez, 16 km S of the junction with the highway to San Jose de Bavicora, 27 km S of Gomez Farias, *R. Spellenberg 9666, R. Corral, J. Brunt, L. Huenneke* (CIIDIR, IBUG, JEPS, MEXU, NY, US); 26 August 1994, Laguna de Babícora, 15 km al SO de San José de Babícora, *C. Yen, E. Estrada 3433* (NY); 27 August 2007, 6 km W of Divisadero at km marker 50 (W of Creel), between San Rafael and Divisadero,*R. Spellenberg 13840* (NY); 27 July 1899, Sierra Madre, 10 mi. S. W. of Chuichupa, *C. H. T. Townsend 95, C. M. Barber* (NY); 10 July 1997, 4 mi NW of Pacheco/Willy jct. on rd. to Rancho Willy, *J. Spencer 560, D. Atwood* (NY); 26 September 1903, San Diego Canyon, *M. E. Jones s.n.* (NY); 9 September 1995, Mesa El Campanero, along Hwy 16, 7.8 mi west of Yécora, 1.1 east of Puerto de la Cruz, *M. Fishbein 2582 et al.* (NY); 1 August 1899/20 August 1899, Near Colonia Garcia in the Sierra Madre, *E. W. Nelson 6174* (NY, US). **SONORA:** 16 August 1998, Ca. 6 air km WSW of Yecora, and 2 rd km S of Puerto de La Cruz and Mex. Hwy. 16 on road up to Mesa del Campanero, *R. Spellenberg 12638, L. Brouillet, T. K. Todsen* (NY); 16/17 September 1934, Barranca Colorad, *F. W. Pennell 18935* (US); 2 August 2011, ca. 5 road miles W then Nof Rincon de Guadalupe,Sierra de Bacadehuachi, *G. Yatzkievych 11-45* (USON); 6 September 1996, 5.2 km west of Yecora on Mex. 16, *T. R. Van Devender 96-414, A. L. Reina, A. Burquez M., J. T. Columbus, G. Ferguson, J. F. Wines* (MEXU, TEX-LL, USON); 6 October 1985, Bocoyna, *R. Bye, E. Linares 14196* (MEXU); 27 July 1974, Between San Rafael and Creel, *R. A. Bye 6616* (MEXU).

53. ***Astragalus lotiflorus*** Hook., Fl. Bor.-Amer. 1(3): 152. 1831

Type:—CANADA, About Carlton-House on the Saskatchewan, North America, non date, *Drummond s.n.* (holotype K000999315 digital image!).

Phaca lotiflora (Hook.) Torr. & A. Gray, Fl. N. Amer. 1(2): 349. 1838.—*Tragacantha lotiflora* (Hook.) Kuntze, Revis. Gen. Pl. 2: 946. 1891.—*Cystopora lotiflora* (Hook.) Lunell, Amer. Midl. Naturalist 4: 428. 1916.—*Batidophaca lotiflora* (Hook.) Rydb., N. Amer. Fl. 24(6): 321. 1929.

Perennial. Stems 1-several, very short, up to 12 cm long, when several, the external ones decumbent or prostrate, strigose, hirsute to pilose, the trichomes up to 2.5 mm long, fine, dolabriform, "t" shaped, joined at one point before the end, with equal ends or one shorter than another, appressed or ascending, straight or sinuous. **Stipules** 2.5–3.8 mm long, semi-clasping, not connate, decurrent, triangular, sometimes with purple tones. **Leaves** 2.5–14 cm long, leaflets 3–17, 2–27 mm long, ovate, elliptic, obovate to elliptic-obovate, abaxially canescent, adaxially glabrate o subglabrate, clearer. Only the description of chasmogamous inflorescences is included. **Peduncles** 2–12.5 cm long, ascending or pendulous with age, the racemes 0.7–2.5 cm long, subcapitate or ovoid, flowers 3–17. **Flowers** ochroleucous, whitish-greene, sometimes distally purple or with blue-purple tones, the veins lavender to purple; the calyx 5–9.7 × 2.2–3 mm, with purple tones, the tube 3.2–4.6 mm long, basally rounded, the teeth 2.2–5.2 mm long, lanceolate; the banner 8.5–14

× 4.6–6.4 mm, oblong to ovate, shallowly o deeply retuse; the wings 7.8–11.8 × 1.6–3 mm long, the claw 3.1–4.4 mm long, the blade 5.1–8.3 mm long, oblanceolate, linear, oblong to lanceolate-obovate, straight or incurved; the keel 6.4–9.8 × 2–3 mm, the claw 3.2–4.6 mm long, the blade 3.3–5.9 mm, obovate. **Pod** 1–3.7 × 0.5–0.8 cm, ascendant but sometimes humistrate with age, straight, lunately incurved, basally narrow to wide rounded, distally contracted in a triangular beak, dorsally widely sulcate in the basal half or flattened, ventrally carinate, the valves strigose or villose, somewhat fleshy, leathery or stiffly-papery, ochre or sometimes with purple tones, reticulate and wrinkled, septum absent; ovules 28–56; seeds 1.5–2.5 mm long, mitten shaped, brown or with purple spots, opaque.

Distribution:—Rare in Mexico, recorded only on southwest Coahuila (Map 51). Also in Canada and USA (Fig. 15).

Habitat:—In limestone gravel, roadside; disturbed vegetation, few collections registered for Mexico.

Comments:—Only two species of *Astragalus* with dolabriform pubescence are found in northeastern Mexico, *A. hypoleucus* and *A. lotiflorus,* easily discernible by their pod as, *A. hypoleucus* is triquetrous.

Specimens examined:—COAHUILA: 23 October 1963, Carneros Pass, 23 mi. south of Saltillo, *H. D. Ripley, R. C. Barneby MEXU,* (NY); 1 November 2004, Jume (Sierra Las Vigas), cerros al NE del Valle de Los Lirios a 6 km de San Andrés hacia Jume, *R. Torres C. 16759B* (MEXU).

54. ***Astragalus lyonnetii*** Barneby, Mem. New York Bot. Gard. 13(1): 162. 1964

Type:—MEXICO, Morelos, Toro, 9000–9800 feet, 5 August 1924, *G. L. Fisher 260* (holotype: US00004205 digital image!).

Perennial. **Stems** up to 30 cm long, decumbent or suberect, strigose and pilose, the trichomes up to 0.6 mm long, appressed, subappressed or completely straight. **Stipules** 1–8 mm long, the lowest ones connate and amplexicual, bidentate, the upper ones connate, attached to the middle of its length or less, pubescent. **Leaves** 3–7 cm long, leaflets 9–27, 2–12.3 mm long, linear, oblong to oblanceolate, distally truncate o retuse, adaxially glabrate. **Pedunucles** 3–11 cm long, almost always with black trichomes, rarely few with ones; the racemes up to 2.5 cm long, dense, with black trichomes, flowers 11–20. **Flowers** ochroleucous, turning pale yellow when drying, ascending, but deflexed with age; the calyx 5.2–7.4 × 2.2–2.8 mm, pilose, with black trichomes, sometimes mixed with few white trichomes, the tube 2.9–4.4 mm long, campanulate, the teeth 2.3–3.8 mm long, subulate; the banner 10–12.5 × 4.1–5.2 mm, rhombic, elliptic to oblanceolate, slightly retuse; the wings 9.5–9.8 × 1.6–2 mm, the claw 4–4.6 mm long, the blade 6.6–7.1 mm long, linear to oblanceolate; the keel 7.7–8.7 × 2.1–2.4 mm, the claw 4–4.7 mm long, the blade 4.5–5 mm long, obovate, abruptly incurved. **Pod** reflexed, stipitate (stipe 2.8–3.1 mm long), the body oblong to elliptic, 10–14.3 × 3.2–3.9 mm, obtusely triquetrous, basally cuneate, distally contracted in a short, straight beak, ventrally convex, dorsally openly sulcate, the valves thin, strigose, with black trichomes, becoming papery, ochre with age, reticulate; seeds not seen.

Distribution:—Endemic to Mexico; recorded around Mexico City, State of Mexico and Morelos (Fig. 16).

Habitat:—In conifer forest, 2500–2700 m.

Comments:—The areas around Mexico City, adjacent areas with the State of Mexico, and Morelos harbor at least 11 species of *Astragalus*, however only two of these have triquetrous stipitate pods, *A. lyonnetii* and *A. micranthus* var. *micranthus.* The later species can be distinguished by its larger racemes (10–16 cm long, rarely 3–8 cm), more flowers per raceme (30–60), smaller petals (banner 4.9–7 mm, wings 6.1–7.9 mm, the keel 4.8–7 mm) and shorter stipe (0.1–0.5 mm). In higher mountains (3000 m or more in elevation), *A. harshbergeri* inhabits the same areas that *A. lyonnetii*, but are easily distinguished by the creeping beahivor and the much wider stipules, which are double the stem´s width. There is a asample collected at Michoacán identified a *A. lyonnetii* (*B. Farfán H. 186,* IEB), however it does not have pods and the racemes have only two flowers; perhaps a misidentification.

Specimens examined:—MEXICO CITY: VIII-1927, Pedregal de San Angel, *E. Lyonnet 176* (NY, US); 11 July 1984, *C. Nieto P., A. Colín PR.1* (IBUG, MEXU). **MORELOS:** 11 July 1976, Tres Cumbres, sobre la carr. Federal a Cuernavaca, *A. Delgado S. 252* (MEXU); 5 June 1972, Autopista, *J. Vázquez 3639* (MEXU); 1 August 1987, *M. Diaz G. 11, E. Cedillo* (ENCB). **STATE OF MEXICO:** 3 September 1967, *D. E. Hernández s.n.* (MEXU); 11 August 1978, *R. Vega A. 381* (ENCB).

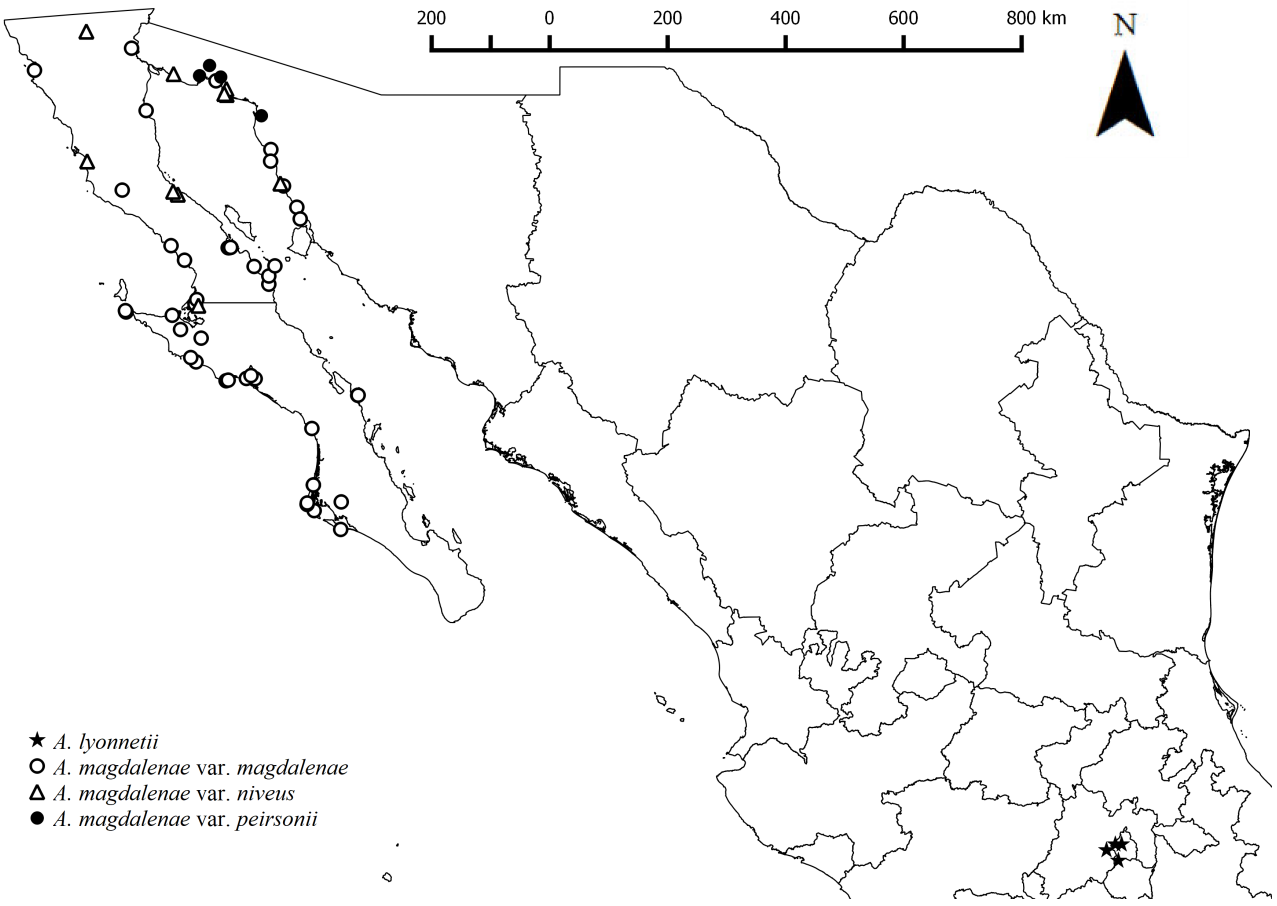

FIGURE 16. Map showing the distribution of *Astragalus lyonnetii, A. magdalenae* var. *magdalenae, A. magdalenae* var. *niveus,* and *A. magdalenae* var. *peirsonii* in Mexico.

55. ***Astragalus magdalenae*** Greene, Pittonia 1(4): 162. 1888

Perennial. Stems silver or lead color, silky, up to 70 cm long, decumbent or ascendant, strigose or villous, the trichomes up to 0.9 mm long, dense, similar or some longer, soft, appressed to sub-appressed. **Stipules** 1–5.7 mm long, clasping or surrounding only a third o almost half of the stem circumference, triangular to deltoid, dorsally pubescent. **Leaves** 1–15 cm long; leaflets 3–23, 1.5–14 mm long, with similar color and pubescence on both faces. **Peduncles** 2–15 cm long, erect or incurved, the trichomes white, sometimes black; the racemes 2.5–6.5 cm long, compact or lax with age, or soon lax; flowers 10–37. **Flowers** variously colored, rose-purple, red-violet, lavender, white only some petals or white in different parts, rose-lavender, turning blue when drying, the banner maculate in the central fold; the calyx 4.1–9.4 × 2.4–3.8 mm, silky, the trichomes white and black, the tube 2.8–4.1 mm long, campanulate, the teeth 1.2–5.2 mm long, linear to triangular; the banner 9.4–14.4 × 6.2–10.5 mm, ovate, elliptic, rhombic to obovate, recurved; the wings 8–13.5 × 2–4 mm, the claw 3–4.4 mm long, the blade 5–10.3 mm long, oblanceolate to narrow-elliptic, somewhat straight or slightly incurved; the keel 7–10.1 × 2.5–3.6 mm, the claw 3–4.3 mm long, the blade 4.7–6.7 mm long, semi-obovate. **Pod** sessile, spreading, 1–3.7 × 1–2.3 cm, ovoid, elliptic to subglobose, inflated bladder-like, basally rounded or turbinated distally, apically contracted in a short triangular beak, ventrally slightly sulcate, dorsally sulcate, somewhat gibous or little convex, the valves light-green, green-tan, ochre or with purple tones, strigose, papery, semi-transparent, softly reticulate, septum absent; ovules 12–30; seeds 1.6–5.5 mm long, mitten shaped, brown or with purple tones, pitted, opaque.

Distribution:—In Mexico, exclusive to coastal dunes of Baja California, Baja California Sur, and Sonora. In Sonora from 31°30'N–114°09'W (near 37 km ESE of Golfo de Santa Clara, through Puerto Peñasco, Álvaro Obregón, Puerto Lobos, El Julio, Campo Julio, Puerto Libertad to Desemboque de los Seris (29°30'N–112 ° 20'W). In Baja California, along the entire western coast, in the central portion, isolated between Mission Santa María (30°24'N–115°52'W) and Nueva Odisea (30°22'N–115°52'W), on the geopolitical boundary of Baja California and Baja

California Sur, from Puerto Venustiano Carranza (28°09'N–113°53'W) and Guerrero Negro, through Campo Queen, San Pablo, San Roque, Asunción Bay, Punta Abrojos, around San Ignacio Lagoon (26°51N–113°07'W), from there to San Carlos, Puerto San Carlos (29°46'N–114°24'W) to Calamajué (29°38'N-114-05'W), along the eastern coast, from Molino (29°46'N–114°24'08'W). In Baja California Sur, along the same eastern coast, registered only in San Antonio (26°32'N–111°30'W).

Comments:—The coastal dunes on the Peninsula of Baja California harbor several species of *Astragalus* with sessile inflated pods that resemble *A. magdalenae*, several obvious and contrasting characters allows differentiation of them. *Astragalus pomonensis* differs by its green-whitish or ochroleucous petals. *Astragalus insularis* has smaller petals (banner 5.5–7.4 mm, wings 5–6.5 mm long, the keel 4.8–6 mm); *A. harbisonii* has connate stipules (at least the lowest ones). *Astragalus hornii* var. *minutiflorus* has strong similarities in the coloration of the foliage, their physiognomy is easily confused with any other ashy colored foliage, but, *A. hornii* var. *minutiflorus* can be distinguished by its inflorescences arranged in compact or oblong racemes; relatively short wings (7–9.8 mm) and relatively and proportionally smaller fruit (9–17 mm long), inhabiting in alkaline soils and cemented terraces, never properly restricted to coastal dunes as *A. magdalenae*.

Three varieties recognized, based on leaflet number and pod size. The flower color of var. *magdalenae* and var. *niveus* varieties present different tones, in both, the same colors are reported in the different petals, so it was considered not to include this characteristic in the keys.

1. Leaflets 3–13; terminal leaflet narrow, longer and of different form than the pair of terminal leaflets; Sonora ..... **var. *peirsonii***
- Leaflets 15–23; terminal leaflet wide, of equal size and shape that distal pair and the rest of leaflets 2
2. Banner 9.4–11 mm long; pod 1.5–2.6 cm long; ovules 16–20; seeds 1.6–2.5 mm long; Peninsula of Baja California and Sonora... ..... **var. *magdalenae***
- Banner 11–12.5 mm long; pod 1–2 cm long; ovules 12–14; seeds 2.5–3.3 mm long; Peninsula of Baja California and Sonora..... .....**var. *niveus***

55.1. ***Astragalus magdalenae*** Greene var. ***magdalenae***

Type:—MEXICO, Baja California Sur, Bahia Magdalena, 11 Febraury 1839, *G. H. Barclay 3135* (holotype (based on *Phaca candidissima*): BM001042734 digital image!).

Astragalus magdalenae Greene, Pittonia 1(4): 162. 1888.

Astragalus candidissimus (Benth.) S. Watson, Bibl. Index 191. 1878; *Phaca candidissima* Benth., Both. Sulphur. 13: 1844.

Tragacantha californica Kuntze, Revis. Gen. Pl. 2: 940. 1891; *Astragalus crotalariae* var. *californica* (Greene) M. E. Jones, Contrib. W. Bot. 10: 50. 1902.

Stems ashy, diffuse, sometimes suberect; leaflets 15–23; petals purple, reddish-violet, lavender, lavender-white, purple-white, pale-purple, rose-purple, purplish; purplish-red, fading blue, wings white tiped; wings white in distal half; purple fading blue, the wings white tipped; wings petal white on upper half, pale violet on most of lower part, banner white in proximal central area, veins violet**;** banner 9.4–11 mm long**;** pod 1.5–2.6 × 1–1.3 cm, with a beak 2.5–8 mm long; seeds 1.6–2.5 mm long. Sometimes forming large clumps.

Distribution:—Endemic to the Peninsula of Baja California and Sonora. In Baja California, mainly on eastern coast from Molino and Molino Lacy (29°46'N,114°21'W) south to Bahia de Los Ángeles (28°56'N, 113°27'W), and from there to San Antonio (26°32'N,111°31'W) (into Baja California Sur. On the western coast from Guerrero Negro (the border area between the two states on the peninusla), Bahia Asunción, Punta Prieta, Punta Abrojos, Laguna San Ignacio to Adolfo López Mateos and Puerto San Carlos (24°47'N, 111°50'W). In Sonora from 31°30'N–114°09'W, approximately 37 km to the ESE of El Golfo de Santa Clara, absent in Puerto Peñasco, present in Álvaro Obregón, Puerto Lobos, Julio, Campo Julio, El Julio, Puerto Libertad to Desmeboque de los Seris (29°30'N–112°20'W) (Fig. 16).

Habitat:—Coastal dunes; coastal dunes 450 m away from beach; subshruby scrubland; low dunes and sand hummocksat margin of salt flat; sandy plains, dry streams,; sparse desert scrub; mangrove areas; 5–75 m.

Specimens examined:—BAJA CALIFORNIA: 27 January 1977, sandy beach near Alfonsinas, on Bahia San Luis Gonzaga, *J. R. Reeder 6699* (MEXU); 6 February1996, 3.3 km north of San Rafael, on the coast of Gulf of California, , sand dunes, *M. A. Baker 12175, R. Johnson* (BCMEX); 26 January 1988, Ca. 6 mmi NW Guerro Negro on Laguna Guerro Negro, *K. Thorne 5862, D. Nelson, J. Chandler* (NY); 10 February1962, Coastal sand dunes about 14 miles south of Puerto San Josè, *I. L. Wiggins and J. H. Thomas 208* (CAS, US); 25 February1962, sandy hummocks

and stabilized dunes at head of inner cove at Bahia de San Francisquito, *I. L. Wiggins 16904* (CAS, MEXU, US); 23 February1966, At south end of Bahia de los Angeles, *R. Moran 12347* (NY, SD, TEX-LL, US); 12 March 1992, *P. Fritsch 1245, L. K. Fritsh, A. Hendersen* (MEXU, NY, SD, TEX-LL); 3 January 1988, Lomas El Carrizo, 55 miles due SE of El Rosario, *M. A. Franklin 5825* (NY25 April 2005, Santa rosalillita; Inmediaciones del Poblado, *J. L. León de la Cruz 10774* (SD); 8 July 1969, 3,8 millas al sur de El Cardón, en dunas de arena cerca de la playa, *D. L. Bostic s.n.* (SD); 21 March 1947, Barril, sandy beach, *C. F. Harbison 41573* (SD); 12 May 1952, Isla sur de san lorenzo, en arena, *R. Moran 4132* (SD); 25 March 1979, 5 km al norte del paralelo 28 en el área de dunas de arena, *J. R. Reder 7099, C. G. Reder* (SD); 1 April, 1991, semistabilized coastal dunes and low slaine areas, on coast of gulf, 44 mi south of Bahia Los Angeles, on road to San Frnacisquito, *S. Boyd 5662* (MEXU). **BAJA CALIFORNIA SUR:** 30 December 2003, Desierto del Vizcaino, along the road from Vizcaino to Bahia Tortugas, near the salt playa, and NW of Laguna La Chayota, *J. M. Porter 13866, L. E. Machen* (BCMEX); 4 February1973, 4 miles NE of Abreojos, *R. Moran 19718, J. L. Reveal* (NY, US); 4-III1-1985, en el borde E de la Laguna Ojo de Liebre a 17 km al O de Guerrero Negro, *D. E. Breedlove 62306* (CAS), TEX-LL); 6 February1973, Malarrimo, *R. Moran 19850* (NY, US, SD); 21 February1962, 14 miles west of salt works at Laguna Guerrero Negro, *I. L. Wiggins 16811* (CAS, MEXU, NY); 15-II1973, 8 miles SE of La Laguna, *R. Moran 20143* (NY, US, SD); 11-14-XI1947, Región del Desierto Vizcaíno, a lo largo de la costa desde San Hipólito hasta Asunción, a lo largo de playas antiguas y modernas, *H. S. Gentry 7766* (CAS, SD); 2 April 1962, Pulpito Bay, *R. Moran 9075* (NY, SD); 3 February1985, Laguna San Ignacio: Parmeter Point on E side of Laguna, *R. F. Thorne 58536* (MEXU, NY); 26 March 1974, Rocky Point, eat shore of San Ignacio Lagoon, *R. Moran 21178* (MEXU, NY, SD); 24 April 1989, Vizcaino Desert, dunes of clam shells and sand along coast of Bahia de la Asunción, near Rancho San Rafael, 11.5 mi E of Bahia Asunción, *S. Boyd 3495, T. Ross, L. Arnseth* (MEXU, NY); 23 March 1984, At the edge of Scammons Lagoon, *D. E. Breedlove 60855* (CAS, MEXU, NY); 4 February1973, Bahía Asunción 16 miles ESE of Asunción, *R. Moran 19745, J. L. Reveal* (NY, US, SD); 2 April 1962, South side of Punta El Pulpito, *I. L. Wiggins 17431* (CAS, MEXU, NY, SD, US); XII-1972, Southeast end of crescent-shaped sand tombolo connecting Cabo San Lazaro to Isla Magdalena, Bahia Magdalena, *A. F. Johnson 26* (NY); 7 April 1973, SE end of sandspit enclosing a lagoon near the abalone canning settlement of Abreojos,*A. F. Johnson 204* (NY); 21 March 1974, S end of Bahia Santa Maria on a crescent tombolo connecting Cabo San Lazaro to Isla Magdalena, *A. F. Johnson 730* (MEXU, NY); 22 March 1975, Sandy barrier island directly opposite Puerto Lopez Mateos (fish cannery), *A. F. Johnson 1212* (MEXU, NY); 2–3 February1985, Laguna San Ignacio: Barrier sand-dunes on W side of Laguna, *R. F. Thorne 58513* (NY); 25 June 1988, Vizcaino Desert; 3 miles south of Puente Eugenia, near sea coast, *T. S. Elias 10838, D. Arias and O. Dorado* (MEXU, NY); 4 January 1994, Guerrero Negro, on the east side of town along the road, *D. Atwood 19069, K. Anderson, K. Thorne* (NY); 1 January 1985, Laguna San Ignacio: Rocky Point on E side of bay, *R. F. Thorne 58498* (MEXU, NY), 30 May 1925, Magdalena Bay, *H. L. Mason 1954* (CAS, NY); 5 April 1961, Arroyo 300 m from beach about 8 miles SE of unta Abreojos, SW of San Ignacio, *I. L. Wiggins 16249* (CAS, MEXU, TEX-LL); 8 April 1971, Isla Magdalena, extremo sur de la Bahía de Santa María, en dunas de arena, *R. M. Beauhcamp 2156* (SD); 21 April 1963, Arroyo en la ladera oeste de la isla Natividad cerca del extremo sur, *R. Moran 10787* (SD); 17 September 1974¸ dunas al NO de Cabo San Lázaro, Isla Magdalena, *R. N. Philbrick s.n.* (SD); 20 December 1990, California. 1 km al sur de Las Barrancas, en las dunas de arena superior e inferior, a 50–100 metros del océano, *D. B. Zippin 83* (SD); 1 April 2005, Guerrero Negro, dunas de arena en el lado suroeste de la ciudad, cerca de la torre de radio y el Colegio México, en la terminal de la avenida, *J. M. Porter 14313, L. Machen, S. DeGroot, J. Anderson* (SD); 13 December 2011, Bahia Magdalena. Isla Magdalena, El Mogote Rico, *J. L. León de la Cruz 11378* (SD); 31 March 1952, Santa Maria Bay, sand dunes, *R. Moran 3541* (SD); 30 March 2015, Isla Natividad: south of Cedros Island and west of Punta Eugenia on the Vizcaino peninsula; along the dirt road and coastal plain on the eastern side of island, *J. Rebman 29653, S. Vanderplank, A. Pigniolo, S. Still* (SD); 9/16 March 1947, Región del desierto de Vizcaino, colinas de arena de la depresión de Vizcaino, suelo arenoso de depresión, sur y oeste de la laguna de Scammon, en el desierto de niebla en dunas lineales activas, *H. S. Gentry 7361* (SD); 8 April 1971, Isla Magdalena, extremo sur de la Bahía de Santa María, en dunas de arena, *R. M. Beauchamp 2156* (SD); 10 April 1971, Playa en el lado oeste de la isla de Natividad, en arena, *R. M. Beauchamp 2186* (SD); 17 April 1987, Punta Abreojos, Mpio. Santa Rosalìa, *P. Tenorio L. 12912, C. Romero de T.* (MEXU); 10 February1996, Man-o-war Cove, W side of Isla Magdalena, ca. 2 air miles N of Puerto Magdalena, *P. F. Zika 12831* (MEXU); 19 April 1987, San Rafael, 19 km al E de Bahia Asunicòn, Mpio. Santa Rosalìa, *P. Tenorio L 12937, C. Romero de T.* (MEXU); 12 April 1976, W. López F. 2 km al W de Colina Coyote, Isla Magdalena (MEXU); 6 April 1977, Colina Coyote, Isla Magdalena, La Del Selenio, *W.L. Forment 345* (MEXU). **SONORA**: 6 March 1992, W side of La Salina saltworks, 0.7 mi inland from beach at La Borrascosa, NW corner of Bahia Adair, *R. S. Felger 92-209, K. Cliffton* (CAS, NY); 11 March 1977, Ca. 1 miles northwest of Desemboque del Rio San Ignacio, *T. R. Van Devender s.n., M. C. Kearns* (NY); 28 February1997, Puerto Lobos on the gulf of California, *A. L. Reina 97-262, T. R.*

Van Devender, S. R. Russell (CAS, MEXU, NY, TEX-LL, USON); 12 February1968, Ca. 1 km south of Desemboque. Vicinity, *R. S. Felger 16997, Edmundson* (NY); 11 February1963, *R. S. Felger 12450, R. Thomas, A. Rusell* (CAS); 4 April 2008, Xnapófc, Old Seri camp, 5 km by road N of Desemboque, *B. T. Wilder 08-190, B. Marazzi, C. Moser-Marlett* (SD, USON); 18 March 2012, Estero los Tanques, Mpio. Canroca, a 74.2 km (línea recta), al SW de Caborca, a 20.3 km (línea recta) al N de Puerto Lobos, *J. J. Sánchez E. 2012-153, D. A. Delgado Z*. (USON); 15-III-2012, duna costera entre Puerto Libertad y Punta Cirio, a 5.4 km (línea recta) al SE de Puerto Libertad, *J. J. Sánchez E. 2012-055, D. A. Delgado Z.* (USON).

55.2. ***Astragalus magdalenae*** Greene var. ***niveus*** (Rydb.) Barneby, Aliso 4: 135. 1958

Type:—MEXICO, Baja California, 15 miles north of San Felipe Bay, February 1904, *D. T. MacDougal s.n.* (holotype (based on *Phaca nivea*): NY00005930!).

Phaca nivea Rydb., N. Amer. Fl. 24: 328. 1929.

Stems erect or ascending, sometimes diffuse; leaflets 15–23; petals purple, red-purple, deep-purple, rose-pink, lilac tinted or only in the tip; banner 11–12.5 mm long; pod 1–2 cm long; seeds 2.5–3.3 mm long.

Distribution:—Endemic to the Peninsula of Baja California and Sonora, in small areas of Baja California and around its border with Baja California Sur and in Sonora. In Sonora, only found at Puerto Peñasco and nearby areas. In Baja California, isolated in three different localities, one on the west coast, between Mission Santa Maria (30°24'N–115°52'W) and Nueva Odisea (30°22'N–115°52'W), another, on the geopolitical border of both two states on the peninsula, near Guerrero Negro (27°58'N–114°04'W), on the eastern coast in areas bordering El Molino (29°46'N–114°24'W) (Fig. 16).

Habitat:—Coastal dunes; sandy soils with disturbance; dry scrublands.

Specimens examined:—BAJA CALIFORNIA: 15 February1986, Torrentes Canyon: east slope of Sierra Juarez, about 1 mi S of Cantu Palms, *S. D. Boyd 1300* (MEXU, NY); 19 September 1980, In the Sonoran Desert about 15 miles north of Guerrero Negro along Hwy #1, near km post 120, *A. C. Sanders 2001, K. R. Naisess, J. West* (NY); 3 March 1966, Coastal dunes, Ensenada de San Francisquito, *R. Moran 12388* (NY); 2 March 1935, Mouth of arroyo along beach at Barril, 48 mi. E. of Pozo Aleman, *I. L. Wiggins 7824* (CAS); 19 September 1980, In the Sonoran Desert about 15 miles north of Guerrero Negro along Hwy #1, near km post 120, *A. C. Sanders 2001, K. R. Neisess, J. West* (NY); 4 January 1994, Guerrero Negro, on the east side of town along the road, *N. D. Atwood 19069* (NY). **BAJA CALIFORNIA SUR:** 4 January 1994, Guerrero Negro, on the east side of town along the road, *D. Atwood 19069, K. Anderson, K. Thorne* (NY); 3 March 1966, Coastal dunes, Ensenada de San Francisquito, *R. Moran 12388* (CAS, NY). **SONORA:** 25 March 1948, Cholla Beach, 8 miles north of Puerto Penasco, *R. Bacigalupi 2872* (CAS, NY, SD); 27 February1958, Cholla Bay, Punta Peñasco, *P. H. Raven 11674A* (NY); 25 April 1921, The Gulf of CaliforniaTepoca BayFrequent on sanddunes, *I. M. Johnston 3306* (CAS, US); 19 March 1979, Commonon dunes N of La Choya Bay, ca. 5 miles N of the town of Puerto Peñasco, *A. F. Johnson 4038* (MEXU); 20 March 1979, common on semistable back-dunes N of La Choy Bay, ca. 5 miles N of the town of Puerto peñasco, *A. F. Johnson 4044* (MEXU); 26 March 1979, rare on dune ca. 2 miles of town of Puerto Libertad, *A. F. Johnson 4102* (MEXU); 20 February1980, frequent on dunes near thee Gulf of California, at the town of El Golfo de Santa Clara, *A. F. Johnson 5116* (MEXU); 11 May 1983, 3.9 miles S of Rio Socorro, *B. A. Prigge 4582* (MEXU); 23 March 1978, beach dunes, estero Morua, E of Puerto Peñasco, *G. L. Webster 22383* (MEXU).

55.3. ***Astragalus magdalenae*** Greene var. ***peirsonii*** (Munz & McBurney) Barneby, Aliso 4: 135. 1958

Type:—USA, Arizona, Imperial County, sand dunes between Holtville and Yuma, 15 April 1921, (holotype (based on *Astragalus peirsonii*): UC495108: isotype MO149247 digital image!, GH58874).

Astragalus peirsonii Munz & McBurney ex Munz, Bull. S. Calif. Acad. 31: 67. 1932.

Stems up to 1 m tall; leaflets 3–13; terminal leaflet narrow, longer and of different shape than the terminal leaflets pair; reported with petals purple or purplish and the banner with white spot.

Distribution:—In Mexico recorded only in El Pinacate Biosphere Reseve (31°34'24''N–113° 30'48.9''W and 31°37'15''N, 113°39'10.5''W), in extreme northwestern Sonora. Also in California (USA) on the Algodones Dunes (Fig. 16).

Habitat:—Sandy dunes; sand hummocks; although of restricted distribution, it is locally common in the areas where registered. Associated with creosote bush; sparse vegetation with starbush; lava fields in the Pinacates; 60–129 m.

Comments:—Variety easily distinguishable by the number of leaflets, especially the terminal decurrent leaflet, resembling a mere projection of the rachis, longer than the rest of the leaflets, as well as its pod and seed size, both, larger than the other varieties.

Specimens examined:—SONORA: 15 March 2010, dunes 8.5 km NE (36°) of the old train station at Gustavo Sotelo, ca. 35 km NW of Puerto Peñasco, *B. T. Wilder 10-64, E. Ezcurra, P. Dayton, G. Dayton, A. Martínez-Greenja, N. Pietrasiak, L. Weller* (USON, SD); 28 May 2005, Mpio. Puerto Peñasco, Reserva de la Biósfera Alto Golfo, y Delta del Río Colorado, , near shore at 5.8 miles,on dirt road (to La Salina), south of Estación López Collada, *R. Felger 05-318, et al.* (SD, USON); 16 March 1970, ca. 1 mile south of Moon Crater (Crater Chichi), SW parto f Pinactae Region, *R. S. Felger 19010, C de Rosa* (ENCB, SD); 23 March 1989, Desierto de Altar, *E. Ezcurra s.n., R. Medina, Al Flores* (MEXU).

56. ***Astragalus mario-sousae*** A. E. Estrada, A. Villarreal & C. Yen, Brittonia 57(4): 314. 2005

Type:—MEXICO, Nuevo León, Municipio Santa Catarina, El Jonuco, 13 June 2001, *E. Estrada 12729, & C. Yen* (holotype: MEXU01196762!; isotype: ANSM083411!, NY00888059!).

Perennial. Stems up to 54 cm long, diffuse, ascending, suberect or sometimes erect, appressed to villous, the trichomes up to 1 mm long, appressed, of two types, ones short and mixed with straight, or slightly longer curved ones. **Stipules** 1.5–2.3 mm long, clasping, connate at least basally, the upper ones clasping only in the base by a tenuous horizontal line. **Leaves** 1.2–4.2 cm long, leaflets 15–21, 2.1–8.2 mm long, elliptic to obovate, pilose in both surfaces, denser abaxially. **Peduncles** 1.1–6.9 cm long, erect or slightly curved; the racemes 2–20 mm long, flowers 4–11. **Flowers** purple or purple with white tones; the calyx 4.6–5.1 × 2–2.3 mm, strigose, pale green, trichomes white, 0.1–0.15 mm long, black, the tube 3.2–3.5 mm long, the teeth 1.2–1.5 mm long, triangular to lanceolate; the banner 9.6–10.1 × 5.2–5.4 mm, obovate, slightly retuse; the wings 8.2–8.4 × 2.2–2.6 mm, the claw 3.2–3.6 mm long, the blade 5–5.3 mm long; the keel 6–6.5 × 1.6–2 mm, the claw 3.3–3.5 mm long, the blade 3.2–3.3 mm long. **Pod** 10–11 × 3.1–3.8 mm, sessile, ascending, oblong, slightly incurved, triquetrous, compressed, ventrally carinate, laterally angles rounded, dorsally widely grooved, basally widely rounded to truncate, distally narrowing abruptly in a short beak, 1–1.9 mm long, the valves stiffly papery, white-strigose, smoothly reticulate, ochre or turning brown to dark-brown with age, septum complete, the pod thence bilocular; ovules 9–11; seeds 2.5–3 mm long, mitten shaped, brown to dark-brown, smooth.

Distribution:—Endemic to Mexico, in Nuevo León (El Jonuco, Santa Catarina municipality) (Fig. 17).

Habitat:—Inhabiting oak-forest; 1800–2000 m.

Comments:—The arid lands in the political border between Coahuila and Nuevo León harbor about 11 species of *Astragalus*, however, only *A. emoryanus, A. greggii, A. mario-sousae,* and *A. nuttallianus* have triquetrous oblong pods. *A. greggii* is the only species with retrorse pubescence. From the other three ones, *A. mario-sousae* is the only one with a perennial habit.

Specimens examined:—NUEVO LEÓN: 13 June 2001, El Jonuco, *E. Estrada 12729, C. Yen*; 5 November 2017, El Jonuco, Mpio. Santa Catarina, *P. Garza-Zambrano 101, E. Estrada* (CFNL, MEXU).

57. ***Astragalus martinii*** Spellenb., van Devender & Jenkins. Phytoneuron 66:1–8. 2014

Type:—MEXICO, Sonora, Mpio. de Yécora, 1 km W of Puerto de la Cruz on MEX 16, N slope of Mesa del Campanero, 30 March 1997, *A.L. Reina-G. 97-458 &, T.R. Van Devender* (holotype: ARIZ419157 digital image!; isotypes: MEXU!, US01268916 digital image!, US02036158 digital image!).

Perennial. Stems up to 30 cm long, radiating from the root or simple, prostrate, suberect to erect, strigulose, the trichomes 0.2–0.3 mm long, adpressed, straight, white. **Stipules** 2–3.5 mm long, clasping, triangular to ovate, sparsely strigose adaxially. **Levaes** 1.5–10 cm long, leaflets 15–23, 2–10 mm long, oblong, elliptic, obovate to to oblong-obovate, rounded, truncate to emarginated apically, abaxially strigulose. **Peduncles** 2–10 cm long, straight to incurved, the racemes 3–15 mm long, dense or loose, subcapitate, 1–11 flowered, the flowers spreading or ascending. **Flowers**

purple, pale lilar with white tones; the calyx 4.5–6.1 × 1.6–2.3 mm, strigulose, the trichomes dense, white, black or mix of both, the tube 2.5–4 mm long, campanulate to subcylindric, the teeth 1.6–2.3 mm long, linear, laceolate to narrowly triangular; the banner 9.7–11.2 × 5–5.5 mm, ovate, narrowly basally for almost 3.6–4.2 mm long, rounded to notched apically; the wings 8.5–10.5 × 1.6–2.5 mm, the claw 3.5–4.9 mm long, the blade 5–5.6 mm long, oblong-ovoid to obliquely-ovoid, incurved, rounded apically; the keel 6.5–8.2 × 1.9 mm, the claw 3.4–4 m long, the blade 3.4–4.2 mm long, oblong-ovate, incurved, apically triangular-rounded. **Pod** sessile, 9–12 × 4.4–6.5 mm, tiquetrous, oblong-ovoid, slightly incurved, basally rounded, distally ending in a short beak, ventrally carinate, laterally convex, dorsally wide-sulcate, the valves stiff to sub-coriaceous, tan turning black with age, strigulose, transversely reticulated, septum complete; seeds 1.3–1.7 mm long, mitten shaped, brown, dull or semi-shiny.

Distribution:—Endemic to Mexico, regionally distributed along the central political border of Sonora and Chihuahua (Fig. 17).

Habitat:—Inhabiting oak-pine forest, 1840 m.

Specimens examined:—SONORA: 7-X-2007, Barranca El Salto, Mesa del Campanero; pine-oak forest, *T. R. Van Devender 2007-1020, A. L. Reina, G. R. Gwiazdowski* (MEXU); 10 March 1996, Between El Llano and Campanero, Mesa del Campanero, W of Yécora, *A. L. Reina G 96-32, T. R. Van Devender, S. L. Friedman* (MEXU); 30 March 1997, Mpio. de Yécora, 1 km W of Puerto de la Cruz on MEX 16, N

slope of Mesa del Campanero, *A. L. Reina G. 97-458, T. R. Van Devender* (MEXU)

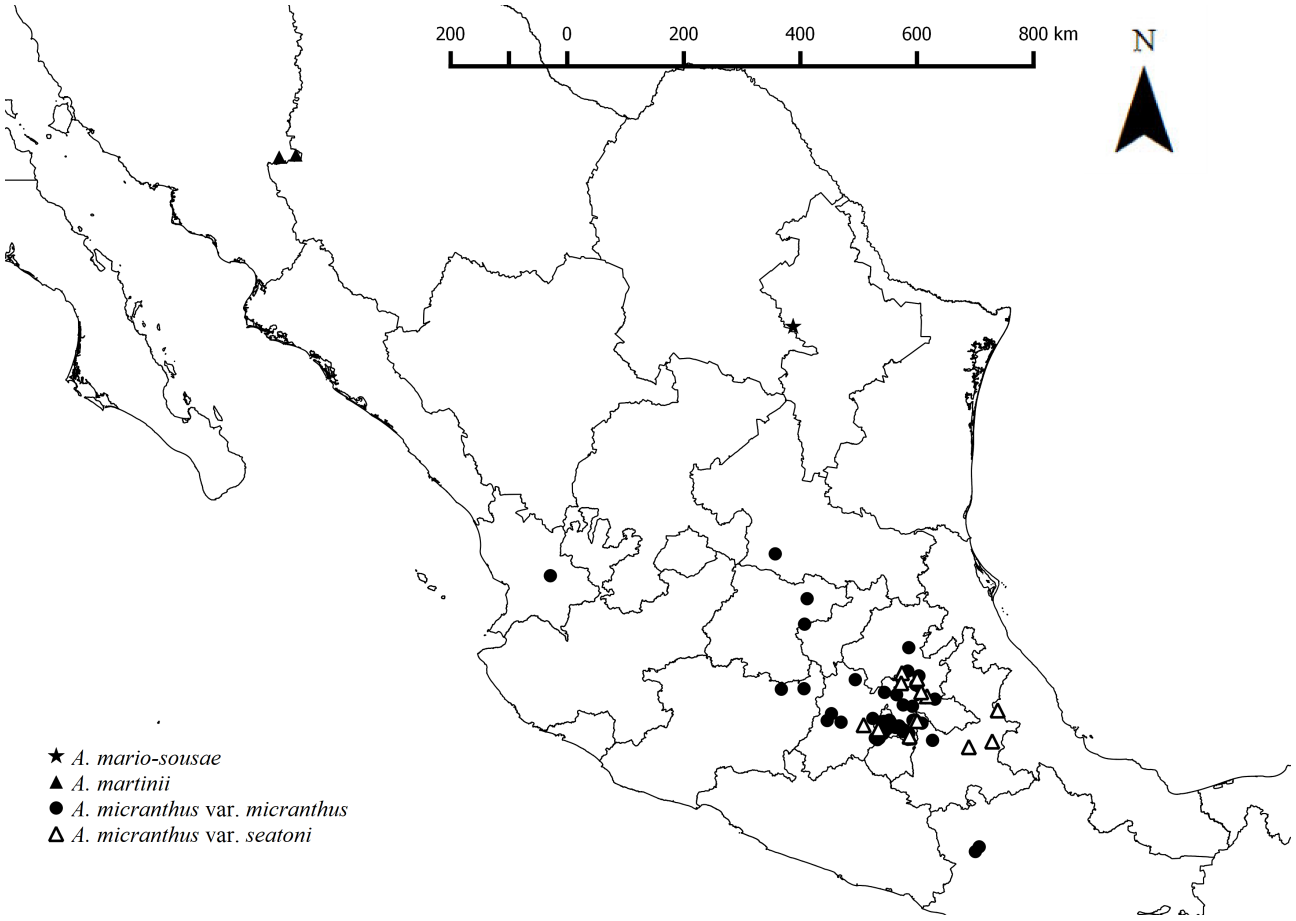

FIGURE 17. Map showing the distribution of *Astragalus mario-sousae, A. martinii, A. micranthus* var. *micranthus,* and *A. micranthus* var. *seatoni* in Mexico.

58. ***Astragalus micranthus*** Desv., J. Bot. Agric. 3: 78. 1814

Perennial. Stems up to 50 cm long, prostrate, creeping or distally ascending, basally single or branched, with minute and strigose pubescence, the trichomes up to 0.6 mm long, appressed or slighlty ascending. **Stipules** 2–7 mm long, the lowest ones amplexicual and connate, the upper ones somewhat clasping to free, lanceolate to ovate. **Leaves** 2–11 cm long, leaflets 17–31, 2–20 mm long, linear, oblong, ovate, elliptic, occasionally truncate or notched apically, the

leaflets similar or diminishing in size distally, adaxially glabrate or almost so. **Peduncles** 2–15 cm long, straight o incurved; the racemes 3–16 cm long, oblong, flowers 25–80, sometimes but rarely as much as 100, deflexed since young. **Flowers** purple, yellow, sometimes pale yellow, becoming ochroleucous, yellow-greenish or brown where it folds and distally yellowish when drying; the calyx 2.5–5.6 × 1.3–2.8 mm, villous to strigose, trichomes mainly black, the tube 1.4–3.3 mm long, campanulate, basally oblique, the teeth 0.5–2.6 mm long, triangular to subulate; the banner 4.4–7 × 3–6 mm, recurved, spathulate to fan-shaped, slightly retuse; the wings 4.4–7.9 × 1.2–2.1 mm, the claw 1.8–3.5 mm long, the blade 2.6–5.1 mm long, oblong to oblanceolate; the keel 3.7–7 × 1.8–2.4 mm, the claw 1.8–3.6 mm long, the blade 2.4–4.3 mm long, semi-obovate, incurved. **Pod** deflexed, stipitate, (stipe minute to 0.5 mm long or smaller, and the pod apparently sessile), the body lanceolate, oblong to elliptic, 5.4–13 × 2.2–3.5 mm, straight o strongly curved, triquetrous, basally obtuse, distally ending in a triangular beak, ventrally keeled, dorsally widely sulcate, the valves thin, papery, greenish to ochre, turning brow-black to black with age, commonly with black trichomes, sometimes some white trichomes present, imperceptibly reticulate, septum incomplete; seeds 1.5–1.6 mm long, mitten shaped, brown o with purple tints.

Distribution:—Central región of Mexico, State of Mexico, Mexico City, Hidalgo, Puebla, Morelos, south to isolated localities in Oaxaca. In northern Mexico recorded only in southeastern San Luis Potosí.

Comments:—From the nine species found in this area, only two species, with simple trichomes and triquetrous pods are found, *A. micranthus* and *A. esperanzae*, the last one with longer flowers (banner 7.4–9.4; wings 7.6–9.6 mm, keel 5.7–7.7 mm) and longer pods (12–18 mm long).

Two varities recognized, based on petals and pod size, as well as number and size of flowers. Stems and racemes size are quite heterogeneous to use them as identification character.

1. Racemes 1–3.5 cm long in fruit, with 15–30 flowers; calyx 2.5–3.1 mm long, the teeth 0.6–1.1 mm long; banner 4.5–5.2 mm long; pod 5.5–8 mm long; Estado de Mexico, Hidalgo, Puebla and Veracruz ..... **var. *seatoni***
- Racemes 3–16 cm long in fruit, with 30–60 flowers; calyx 3.8–5.6 mm long, the teeth 1.1–2.6 mm long; banner 4.5–7 mm long; pod 8.5–13 mm long; State of Mexico, Mexico City, Guanajuato, Hidalgo, Michoacán, Morelos, Oaxaca; Puebla, San Luis Potosí ..... **var. *micranthus***

58.1. *Astragalus micranthus* Desv. var. *micranthus*

Type:—Not origin given, in hortis colitur, ex Hort. Paris., 1809; habitat in Mexico, (holotype: (holotype: P (not found); isotype P00585116 digital image!, P00585115 digital image!).

Astragalus micranthus Desv., J. Bot. Agric. 3: 78. 1814.

Astragalus hartwegii f. *pringlei* Gand., Bull. Soc. Bot. France 48: 1902.

Astragalus seatonii M. E. Jones var. *crucis* M. E. Jones, Rev. N.-Amer. *Astragalus* 281. 1923.

Astragalus rosei M. E. Jones, Rev. N.-Amer. *Astragalus* 190. 1923.—*Atelophragma rosei* Rydb., Bull. Torrey Bot. Club 55: 163. 1928.

Astragalus saltonis M. E. Jones, Rev. N.-Amer. *Astragalus* 279. 1923.—*Hamosa saltonis* Rydb., Bull. Torrey Bot. Club 54: 332. 1927.

Main features as in the keys.

Distribution:—Endemic to Mexico, with the general distribution of the species, mostly concentrated in the State of Mexico and adjacent states, with isolated localities in San Luis Potosí and Oaxaca (Fig. 17).

Habitat:—Flat areas; rocky hillsides; wet slopes; roadside; lacustrine areas; paddocks; clayey and marshy soils; slopes; pine forests; pine-oak forest; oak-pine humid forest; grasslands; disturbed areas; fir-oak forest; coniferous forest; alpine grassland; grassland on hillsides; overgrazed grasslands; corn fields; roadside; 1900–3050 m.

Specimens examined:—GUANAJUATO: 18 July 1990, Cañada de Pozos*, E. Ventura, E. López 8316* (ENCB, IBUG, IEB, MEXU); 18 July 1989, La Noria, 10 km al E de San Luis de La Paz, *E. Ventura 6884, E. T. López* (ENCB, IEB, MEXU). **HIDALGO:** 28 June 1975, 3 km al NW de Pachuca*, M. Medina 461* (CIIDIR, ENCB, MEXU); 21 June 1905, On Hacienda Palmar, near Pachuca*, J. N. Rose 8811, J. N. Paintier* (NY); 24 July 1966, Cerro Jaltepec, s. of Hacienda Tetlapayac, 12 km ESE of APAM. N. slopes, *C. R. West* (NY); 1 September 1963, El Ocote, *L. G. Quintero 296* (NY, US); 7 June 1976, Zempoala*, A. Ventura A. 1497* (CAS, ENCB, MEXU, NY); 24 July 1980, Presa madero, 12 km km al W de Huichapan, Mpio. Huichapan, *R. Hernández M. 4561* (ENCB, MEXU6 September 1973, Cerro Alto, 2 km al S de Epazoyucan, *Rzedowski 31101* (ENCB, MEXU); 13 July 1898, Valley of Tula, *C. G. Pringle 7595* (MEXU); 14 July 1977, 2 km al WSW de Real del Monte, Mpio. Real del Monte, *M. Medina C. 2049* (ENCB); **MEXICO CITY:** 8 August 1965, Claros cercanosss al 4ª Dinamo, Deleg. Contereras, *Rzedowski 20396* (CAS, ENCB); 1 August 1975, Valley surrounded by pine on Free Hwy. 95 to Cuernavaca about ½ mi. s. of Parrez,

Ellis, Dunn, LeDoux 1094 (CAS, ENCB, NY); 15 August 1914, San Borja, Mixcoac, *G. Arsene 10990* (CAS); 16 July 1977, San Francisco Tlanepantla, delegación de Xochimilco, *A. Ventura A. 2911* (CAS, ENCB, MEXU, NY); 5 September 1959, La Cima, south of Mexico City, *O. Degener 26249* (NY); 14 September 2007, Cienega Grande, *E. Martínez 39846* (MEXU); 2 October 1977, Vertiente S del Cerro de la Caldera, delegación de Tláhuac, *Rzedowski 35340* (ENCB, MEXU); 25 October 2000, Zona chinampera de San Gregorio Atlapulco. Área Natural Protegida: Ejidos de Xochimilco, *A. Ramos L. 646* (MEXU); 3 August 1952, Parte occidental del Pedregal, *Rzedowski 1438* (ENCB); 31 July 1965, *R. Kral 25248* (ENCB); 13 June 1965, *Rzedowski 19916* (ENCB); 14 August 1960, Lava fields ca. 2 km SSW of La Cima R.R. Station, on either side of old highway 95, on top of Serjanade Ajusco, ca. 1 km of the Morelos Border, *H. H. Iltis 959, R. Koeppen, F. Iltis* (ENCB); 16 August 1964, Estación La Cima, Serranía del Ajusco, *Mendoza s.n.* (ENCB). **MICHOACÁN:** 28 June 1986, Rancho Santiaguito, al SW de Maravatìo, *J. Santos M. 1422* (CIIDIR); 14 July 1986, Cerca de Araró, camino a Andocutin, Mpio. Zinapécuaro, *J. Santos M. 1538* (CIIDIR, ENCB, IBUG, IEB); 28 June 1986, Rancho Santiaguito, al Suroeste de Maravatío, *J. Santos M. 1422* (ENCB, IEB, MEXU). **MORELOS:** 5 August 1906, Mountains side, Tres Marias, *C. G. Pringle 13780* (CAS); 7 September 1989, Rancho "San Lorenzo" Km 53.5 de la carretera federal México-AcaPULCO (95), al SW del poblado Tres Marías, *I. Diaz B. 1010, R. Noriega T.* (MEXU); 25 August 1991, Andocutín, *J. M. Escobedo 2088* (IEB, MEXU); 23 October 1987, 1 km después de la desviación a Cuautla, sobre autopista a Cuernavaca, *M. Diaz G. 142, et al.* (ENCB); 11 July 1960, 1.5 km N of Tres Cumbres, on old highway 95, *H. H. Iltis 95 et al.* (ENCB). **NAYARIT:** 27 October 1989, Tepic, 22.3 km al W de Huajimic, brecha a Tepic, *P. Tenorio L. 16749, G. Flores* (MEXU). **OAXACA:** 29 June 1979, Tierra Azul, a 8 km al NE de Tlaxiaco, distrito de Tlaxiaco, *M. Sousa 10634* (CAS, MEXU, NY); 10 August 1985, 4 km al NE de la desviación a Tlaxiaco. Carr. Putla-Tlaxiaco. Distr. de Tlaxiaco, *R. Torres Colin 7242, M. L. Torres C., C. Martínez* (NY). **PUEBLA:** 26 July 1970, Carretera libre Mèxico-Puebla, k 63.4 a ca. 2 km al E de Rìo Frìo, Mpio. Tlahuapan, *R. Weber 511* (CAS, ENCB); 18 August 1944, Puenta del Emperador near La venta, *A. J. Sharp 44359* (MEXU); 17 August 1976, Chipilo, o sea a 14 km al W de Puebla, *M. Sousa 5739, C. Ramos, O Tellez, L. Rico* (MEXU); 26 July 1970, Carrtera libre México-Puebla, km 63.5 a ca. 2 km E de Río Frío, Mpio. Tlahuapan, *R. Weber 510* (ENCB); 5 August 1970, Carretera libre México-Puebla, 63.4 a 1.5 km de Rìo frìo, Mpio. Tlahuapan, *R. Weber 415* (ENCB). **QUERÉTARO:** 23 September 1994, 6 km NW de La Luz, Mpiop. Querétaro, Hacienda Raspiño, *Rzedowski 52476* (IEB). **SAN LUIS POTOSÍ:** 1878, Chiefly in the region, *C. C. Parry 168, E. Palmer* (NY). **STATE OF MEXICO:** 15 October 1980, 3 km al sur de Temamtla, Mpio. Temamatla, *S. Becerra 103* (CIIDIR, ENCB); 7 September 1985, 15 km al SW de Villa Victoria, carr. A El Oro, *J. C. Soto N. 10315* (ANSM, IBUG); 3 August 1949, Lago Zempoala, *J. Taylor 60* (NY); 28 May 1980, Tres Cumbres, Valle de Mexico, *E. Matuda 19088* (NY); 24 June 1965, Huisquilnango, *E. Matuda 21076* (NY); 27 August 1965,); 6 km SW of Rio Frio on old highway 190 at km 56, *K. E. Roe 1450, E. Roe, S. Mori* (NY); 19 August 1910, Ajusco, *C. R. Orcutt 3723* (NY); 18 July 1965, 2 km al N de Tecamac, sobre la carretera a Tizayuca, *Rzedowski 20228* (ENCB, NY); 3 October 1976, Ladera SE del Gerro del Pino, *P. Arreguín 101* (ANSM, CAS, ENCB, MEXU, NY); 20 August 1943, 1 km. south of San Juan, *R. T. Clausen 6026, R, Cervantes G.* (ENCB, MEXU, NY); 9 July 1950, Llano Grande, *E. Matuda 19221* (MEXU, NY); 29 July 1951, La Venta, Sta. Rosa-Contreras, *E. Matuda 21270* (NY); VIII-1930, San Andrés, *E. Lyonnet 701* (ENCB, MEXU, NY); 15 August 1972, 7 km al E de Cuautlalpan, Mpio. Chalco, *Rzedowski 29142* (CAS, ENCB, MEXU); 11 July 1953, Llano Grande, Río Frio, *E. Matuda 28714* (NY); 4 July 1975, Estación Experimental de INvestigación y Enseñanza de Zoquiapan. 8 Km. S. de Río Frio. Llano de Aculco, alrededores del edificio, *S. D. Koch 75269* (CAS, ENCB, MEXU); 21 September 1969, 1 km al S de San Juan Citlatepec, Mpio. Zumpango, *A. C. Mendoza 238* (CAS, ENCB); 23 June 1966, 20 km al NE de Texcoco, *Rzedowski 22449* (CAS, IEB, NY); 21 August 1972, Along Hwy 95, south of Mexico City, just south of El Gordo, *Dziekanowski, Dunn, Bolingbroke 2010* (CAS, ENCB, MEXU, NY); VIII-1904, Amecameca, *C. E. O. Kuntze 23644* (NY); IX-1903, Near Cima, *J. N. Rose 7166, J. H. Paintier* (NY); 7 September 1985, 15 km al SW de Villa Victoria, carr. A El Oro, *J. C. Soto N. 10315* (IBUG); 26 October 1980, 1 km al N de San Juan Citlaltepec, Mpio. Zumpango, *A. Moreno M. 213* (IEB); 14 September 1980, Rancho San Luis Aculco, Tenango del Aire, *Hinton 17995* (ENCB, IEB, MEXU, TEX-LL); 18 July 1983, Ixtapaluca, Llano Grande, *E. Ventura V. 1102* (IEB, MEXU); 1 July 1983, Ixtapaluca, Llano Grande, *E. Ventura V. 1039* (IEB, MEXU, TEX-LL); 30 August 2014, A 3.6 km al W de San José del Rincón, *D. Álvarez 13770bis* (MEXU); 3 October 1976, Ladera SE del Gerro del Pino, *F. Arreguín 101* (MEXU); 31 July 1954, Saucingo, Texcoco, *E. Matuda 31259* (MEXU); 27 August 1965, 6 km SW of Rio Frio on old highway 190 at km 56, *K. Roe 1450 et al.* (ENCB); 13 August 1896, Sierra de Las Cruces, *C. G. Pringle 6445* (ENCB, MEXU); 5 November 1978, 2 km al SE de Amecameca, Mpio. Amecameca, *G. Flores M. PV 7899* (ENCB); 12 September 1993, Colonia EL Molino, Delegaciòn Iztapalapa, calle Fco. Sarabia entre Cda. Mezquite y San marcos, muestra 687), *H. Vibrans 4533* (ENCB); 23 June 1963, Cuautitlàn, *Rzedowski 16783* (ENCB); 6 August 1967, Cerro El Sacromonte, Mpio. Amecameca, a orilla del camino, *R. Bahena R. s.n.* (ENCB); 16 September 1973, 10 km al

NNE de Otumba, *Rzedowski 31161* (ENCB); 16 August 1980, km 7 Otumba-Tizayuca, Axapusco, *M. Castilla 671, D. Tejero, s.n.* (ENCB); 12 August 1980, Llano Tepochaico, 10 km al S del Llano Grande, Mpio. Ixtapaluca, *Rzedowski 36812* (ENCB); 13 August 1972, 5 km al W de Amecameca, *J. Espinosa 1050* (ENCB); 20 July 1967, 3 km al E de Coatlinchán, Mpio. Texoco, *Rzedowski 24093* (ENCB); 3 October 1976, ladera del Cerro del Pino, Mpio. Ixtapaluca, *N. H. Matamoros 24* (ENCB); 25 July 1975, Jaltepec, Mpio. Ajapusco, *A. Ventura A. 32* (ENCB); 30 July 1977, Along Hwy 15 , 21 miles W of Toluca, cultivated area, *Wieder 120 et al.* (ENCB); 26 July 1964. Camino sobre Santiago Tilapa y San Miguel Tilapa, , *L. González Q. 1143* (ENCB); 15 September 1966, Cerro del Pino, 3 km al NNW de Ixtapaluca, *R. Cruz C. 1243* (ENCB).

58.2. ***Astragalus micranthus*** Desv. var. ***seatoni*** (M. E. Jones) Barneby, Mem. New York 164. 1928

Type:—MEXICO, Veracruz, Mt. Orizaba, 10,000° alt., 6 August 1981, *H. E. Seaton* (holotype: no lo encuentoro como tale n US, es el isosyntype; isosyntype: US00001579 digital image!).

Distribution:—Endemic to Mexico, with a narrower distribution than the previous one, recorded in southern Hidalgo at the northwestern border with Puebla (at the height of Acaxochitlán and Huauchinango), southern end Hidalgo (Tepeapulco, Apan and Almoloya), almost to the border with Tlaxcala, western Puebla on the border with Veracruz and central Oaxaca (Fig. 17).

Habitat:—Ruderal weed; mountainous areas; oak-pine forest, along roads, flooded areas; 2250–2750 m.

Specimens examined:—HIDALGO: 10 August 1981, 6 km al NW de Apan, Mpio. Apan, *R. Hernández M. 6308 et al.* (CAS, ENCB); 6 April 1981, 2 kms. al sur de Epazoyucan, *R. Hernández Magaña 5969, L. Cortés, I. Hernández* (CAS, ENCB, MEXU); 16 August 1974, Río Frío, 15 km Río Frío, Estación Forestal Zoquiapan, *C. Rodríguez 1266, E. García, J. García* (ENCB); 24 June 1981, 4 km a E de Tlaxiaca, Mpio. Tlaxiaca, *R. Hernández M. 6140* (ENCB); 20 June 1981, Carretera a Tolcayuca, cerca de entronque a Pachuca, *M. Equihua 763* (IEB); 2 August 1963, 2 km al N de Ciudad Sahagún, sobre la carretera a Tlanalapan, *Rzedowski 16989* (IEB). **MEXICO CITY:** 25 September 1966, 3 km al SW del Ajusco, *R. Cruz C. 1334* (ENCB); 14 August 1960, Alrededores de la Estación La Cima, Serranìa del Ajusco, *Rzedowski 12594* (ENCB). **PUEBLA:** VII-1911, Calchicomula, *J. N. Rose 5660, Hay* (NY); 27 June 1899, Between Tepeaca + Santa Rosa, *J. N. Rose s.n., W. Rough* (US); 19 July 1947, about three miles east of Rio Frio, *C. M. Rowell, G. L. Webster F. A. Barkley 17M370* (ENCB, MEXU); 12 August 1901, Hills above Chalchicomula, *C. G. Pringle 8562* (MEXU). **STATE OF MEXICO:** 4 August 1958, Near Kilometer 72 on Amecameca-Popocatepetl road, *J. H. Beaman 2118* (MEXU, US); 18 July 1938, Ojos de Aguato Toluca, *E. K. Balls 5063* (US); 23 July 1967, Parque Nacional Miguel Hidalgo y Costilla, (La Marquesa), Mpio. Lerma, *Sánchez León 67* (ENCB); not date, San Pedro Nexapa, *M. Villegas D. s.n.* (ENCB). **VERCARUZ:** 12 July 1971, Carretera 140, limite Edos. Puebla-Veracruz, *L. I. Nevling 1610* (MEXU, NY); 7 July 1970, Totalco, *F. Ventura A. 1533* (ENCB, IEB, MEXU); 25 August 1975, 3 km al S de Totalco, Mpio. Totalco, *M. Velázquez 2083* (ENCB).

59**.** ***Astragalus mollissimus*** Torr., Ann. Lyceum Nat. Hist. New York 2(6): 178 (–179). 1827

Perennial. **Stems** short, up to 23 cm long, when abundant, the external ones diffuse and prostrate, the central ones ascending or decumbent, always shorter than longer leaves, sometimes acualescent, densely or soflty (with age) pilose, the trichomes 0.4–2 mm long, two types, ones short and curled, the longer ones ascending to extended, straight to sinuous, and always spirally-curled, both types turning rusty to yellowish with age. **Stipules** 2.7–17 mm long, semi-clasping, not connate, lanceolate, triangular to caudate. **Leaves** 3–26 cm long, leaflets 11–35, 3–47 mm long, ovate, oblong-obovate, obovate to orbicular, coarse and hard, of similar size or the distal ones, gradually decreasing in size. **Peduncles** 1–25 cm long, at the bigining ascending, but prostrate or reclinate (by the weight of the developed fruits) with age; the racemes 1–17 cm long, short and dense when young, but increasing in size with age, flowers 7–45. **Flowers** white-cream, purple, rose-purple, rose-lavander, yellowish with lilac tones, turning bronze with age; the calyx 6.8–14 × 3.4–7 mm, strigose to villous, white, rarely mixed con black trichomes, the tube 4–9.5 mm long, campanulate to cylindrical, usually contracted distally, gibbous, the teeth 1.7–5.6 mm long, lanceolate to linear-setaceous; the banner 11.8–24.5 mm long, widely oblanceolate, basally narrow, subentire to reniform apically; the wings 11.5–24 mm long, narrow oblong, incurved; the keel 0.9–2.45 × 0.4–1.3 cm, semi-obovate, incurved. **Pod** sessile, ascending, frequently humistrate with age, oblong, elliptic, lunate, ovate, turgid, widened, somewhat inflates, but not bladder-

like, obcompressed, basally rounded or truncate, distally contracted in a short conic beak, slightly sulcate along both sutures, straight to incurved, the valves fleshy, hard, stiffy to rigid papery, rugose, reticulate, glabrate, strigose to villous, septum complete, the pod thence bilocular; ovules 20–31; seeds 2–2.8 mm long, mitten shaped, purple brown, dark-orange, olive, sometimes black or with purple tones, opaque.

Distribution:—Species with a wide distribution in Mexico, from Chihuahua, northwestern Durango to the northeastern, in the arid region of Nuevo León, to Mexico City and Veracruz.

Three varieties distributed in Mexico (Barneby, 1964). Mainly diferentiated by the pubsecence size on fruit, fruit size and, chamber numbers in the beak.

1. Trichomes of pod shorter than 1 mm long ..... **var. *eralei***
- Trichomes of pod longer than 1 mm long (if shorter than 1 mm, the beak of the pod unilocular 2
2. Pod ovoid, beak unilocular ..... ***A. m.* var. *irolanus***
- Pod narrow-oblong to lanceolate-elliptic, beak bilocular..... ***A. m.* var. *bigelovii***

59.1. *Astragalus mollissimus* Torr. var. ***bigelovii*** (A. Gray) Barneby, Mem. New York Bot. Gard. 13(2): 743. 1964

Type:—USA, Texas, On the Organ Mountains, northeast of El Paso; 30 April 30 1852, *Wright 1358* (holotype (based on *Astragalus bigelovii*): GH00058668 digital image!; isotype: GH00263296 digital image!, BM001042756 digital image!, P00585122 digital image!).

Astragalus bigelovii A. Gray, Smithsonian Contr. Knowl. 5(6): 42. 1853.—*Tragacantha bigelovii* Kuntze, Revis. Gen. Pl. 2: 943. 1891.—*Astragalus bigelovii* var. *typicus* Barneby, Leafl. West. Bot. 4: 60. 1944.

Pubescence of pod 1 mm long or longer, if shorter, the beak of the pod unilocular; pod narrow-oblong to lanceolate-elliptic, beak bilocular.

Distribution:—Variety with restricted distribution in Mexico, registered in the extreme north of Sonora (Naco and Agua Prieta) and Chihuahua (Janos). Also, in New Mexico, Arizona and Texas (USA) (Fig. 18).

Habitat:—Soils with volcanic pebbles; limestone; shallow slopes between valleys, with grassland-scrub; grasslands; desert scrub; overgrazed grasslands; 1480–1500 m.

Specimens examined:—CHIHUAHUA: 20 March 1984, Rolling hills 0.4 miles east of Highway 2 at a point 5.2 road miles northwest of Arroyo Salto de Ojo and 14.3 miles northwest of Janos*, A. C. Sanders 4731, W. Charlton, McIntosh, Vanway, Gibeaut, Gould* (NY); 22 April 1891, St. Diego*, C. V. Hartman 605* (JEPS). **SONORA:** 4 May 2007, Dry represo (tank) in Arroyo La Bruja, Rancho La Morita, ca. 24 km west, 5.5 km south (by air) of Agua Prieta; Chihuahuan desertscrub/desert grassland, *A. L. Reina G. 2007-581, T. R. Van Devender* (MEXU, USON); 9 April 2003, 12.7 km southeast of Naco on road to Cananea at junction with MEX 2, *T. R. Van Devender 2003-341, A. L. Reina, G. Anderson* (MEXU, USON); 19 April 2007, Hill east of Arroyo La Bellota, Rancho La Morita, ca. 25 km west, 3 km south (by air) of Agua Prieta, *T. R. Van Devender 2007-476, A. L. Reina, E. Enderson* (MEXU, USON).

59.2. *Astragalus mollissimus* Torr. var. ***earlei*** (Rydb.) Tidestr., Proc. Biol. Soc. Washington 48: 40. 1935

Type:—USA, Texas, Jeff Davis County, Davis Mountains, Limpia Canyon, 5 April/3 May 1902, *Earle & Tracy 226* (holotype (based on *Astragalus earlei*): NY00005408!; isotype: F0058902F digital image!, GH00058723 digital image!, PH00005411 digital image!, US00004076 digital image!, MO149264 digital image!).

Astragalus earlei Greene ex Rydb., N. Amer. Fl. 24(7): 444. 1929.

Astragalus pervelutinus Rydb, N. Amer. Fl. 24: 444. 1929.

Pubescence in pod shorter than 1 mm long, rarely, the pod glabrate; petals variable in color tones, yellow (*Estrada 1829,* ANSM*),* cream (*P. F. Zica 8471*, NY), purple (*P. F. Zika 8626*, NY), rose-purple, red-purple (*D. S. Correl 21586*, NY) or yellowish distally and marginally purple opaque tinted, wings with whitish to yellowish apex.

Distribution:—Distributed in the arid region of northern Mexico, from northwestern and central Chihuahua, extreme northern Durango, northwestern and southern Coahuila to extreme northern Zacatecas and southwestern San Luis Potosí (surrounding San Luis Potosí City). Also, in Texas and New Mexico (USA) (Fig. 18).

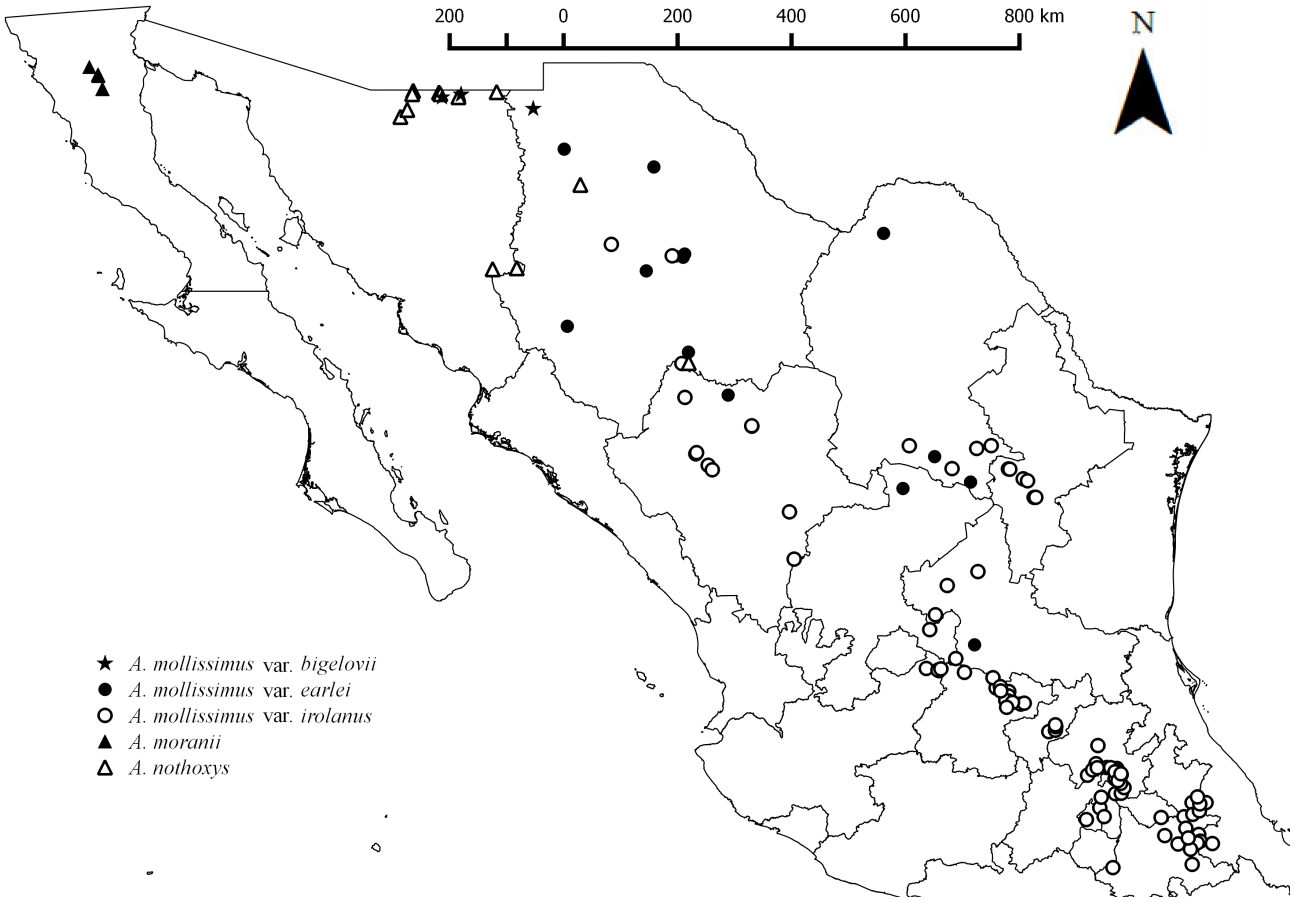

FIGURE 18. Map showing the distribution of *Astragalus mollissimus* var. *bigelovii, A. mollissimus* var. *earleri, A. mollissimus* var. *irolanus, A. moranii,* and *A. nothoxys* in Mexico.

Habitat:—Igneous, clayey, gravelly, and calcareous soils; clayey plains; grasslands with *Juniperus*; izotal; microphyllous scrubland; desert scrubland; oak forests; overgrazed grasslands; mezquite scrublands; oak-doulgas fir association; 1300–3000 m.

Specimens examined:—CHIHUAHUA: 9 October 1993, Rancho Rincón de Los Pastores, Mpio. Saltillo, apox. 15 km al SW de Saltillo, , brecha Slatillo-General Cepeda, *M. A. Carranza 1785, L. Zamora,* (CIIDIR); 9 March 1997, Alrededores de Chihuahua, asociaciones de Mimosa, Acacia, *E. Estrada 6890, C. Yen* (ANSM, MEXU); 13 May 1929, San Ysidro, S.W. of Barranca*, Y. E. J. Mexia 2527-a* (NY); 1 April 1885, Hills and plains near Chihuahua*, C. G. Pringle 189* (NY); 29 March 1886, Plains near Chihuahua*, C. G. Pringle 883* (NY); 23 May 1929, San Ysidro, 3 miles W of., *Y. Mexia 2553* (NY); 15 March 1985, Route 45, near San Cristóbal*, P. F. Zika 8626* (NY); 9 March 1985, Canyon Mina Viega. Sierra Santa Eulalia*, P. F. Zika 8510* (NY); 30 March 1971, 37 mi S of Ahumada; on Mex. hwy 45, *B. J. Cox 3317* (NY); 8–27 April 1908, Vicinity of Chihuahua*, E. Palmer 5, 78* (NY); 7 May 1959, Old lava flow, 9 miles west of General Trias, *D. S. Correll 21586, I. M. Johnston* (NY); 9 May 1959, 3–5 miles southeast of Nueva Casas Grandes, *D. S. Correll 21651, I. M. Johnston* (NY); 19 July 1977, 2.0 mi NE of Aquiles Serdan, Sierra Santa Eulalia (plaza) (SE of Chihuahua City) (dirt road behind hill with the cross), *E. Letho L21535, D. J. Pinkava, B. Parafitt, T. Reeves* (NY); 7 March 1985, Near San Antonio, Sierra Santa Eulalia, *P. F. Zika 8475* (NY **COAHUILA:** 29 April 2000, Ejido Patagaleana, carretera General Cepeda-Parras, aprox. 45 km de General Cepeda a Parras, *M. A. Carranza C-3220, L. Zamora* (ANSM); 11 April 1981, Sierra de Parras, al E en Tanque Nuevo, *A. Rodríguez 270, M. A. Carranza* (ANSM. MEXU); 17 September 1989, Sierra Maderas del Carmen*, E. Estrada 1829* (ANSM, NY); 10 July 1941, At Fraile, 59 km south of Saltillo, *L. R. Stanford 253, K. L. Retherford, R. D. Northcraft* (NY); 19 August 1974, 7.3 mi. W of Fraile*, R. W. Spellenberg 3789, J. Syversten* (NY); 11 April 1981, Sierra de Parras, al este de Tanque Nuevo, *A. Rodríguez, M. A. Carranza s.n.* (ENCB). **DURANGO:** 21 July 1975, Chiefly in the region, *Torke 126, LeDoux, Dunn* (NY). **SAN LUIS POTOSÍ:** 1878, Chiefly in the region, *C. C. Parry 171, E Palmer* (NY); 7 August 1934, Charcas, *C. L. Lundell 5086* (JEPS). **ZACATECAS:** 28 March 1973, 7½ km by road WSW of Cavopa on road to Camacho, *M. C. Johnston 10451F, F. Chiang, T. L. Wendt* (MEXU, NY).

59.3. *Astragalus mollissimus* Torr. var. ***irolanus*** (M. E. Jones) Barneby, Mem. New York Bot. Gard. 13: 740.1964

Type:—MEXICO, Hidalgo, Collected near Irola, 14 June 1899, *J. N. Rose & Hough 4557* (holotype (based on *Astragalus orizabae* var. *irolanus*): US00004242 digital image!, US00005817 digital image!; isotype NY00005817!).

Astragalus irolanus (M. E. Jones) Rydb., N. Amer. Fl. 24: 444. 1929.

Phaca mollis Kunth, Nov. Gen. Sp. 6. 496.

Astragalus humboldtii A. Gray, Proc. Amer. Acad. Arts 6: 195. 1864.

Astragalus orizabae Seaton, Proc. Amer. Acad. Arts 28: 117. 1893.

Astragalus niquiriciaefolius Sessé & Moc., Fl. Mexic., ed. 2 168. 1894.

Variety endemic to Mexico, subacaulescent, the pubescence in pod longer than 1 mm long; pod ovoid, beak unilocular. Petals variables in color, but in different composition than var. *earlei*, purple (*M. Vázquez* 2044, ANSM; *S. Zamudio 3379*, ANSM, MEXU), ochroleucous, turning yellowish (*Spellenberg 2596,* NY; *E. Estrada 1617*, ANSM, MEXU) or purple when drying (*Estrada 2485,* NY), banner tip with lilac tones (*Spellenberg 2596,* NY), white with lilac tones (*Díaz V. 450*, ANSM, MEXU), wing tips whitish or almost so, completely (*Rzedowski 43503*, CIIDIR) or only basally lilac (*Spellenberg 2596,* NY) to reddish-violet (*Spellenberg 3789,* NY), keel apex purple.

Distribution:—This is the variety with the widest distribution in Mexico, aisolated populations in central Chihuahua (Ciudad Chihuahua), southwestern Coahuila (Saltillo) and southern Nuevo León (Galeana), further south, in central and southern Zacatecas, northern and western San Luis Potosi, through Guanajuato, extreme northwestern Jalisco, also in Querétaro, Hidalgo, Estado de Mexico, Mexico City, Morelos, Puebla to central-western Veracruz (Fig. 18).

Habitat:—Eroded low slopes; dry and stony slopes; stony, alluvial, calcareous, sandy, clayey, andesite, rhyolitic, saline, red, and basalt soils; halophytic grasslands; blue grama grassland; grassland with sparsed pines; creosote bush shrubland; oak shrubland; oak-pine forest; grassland with catclaw; coniferous forests in valleys; pine forest, juniper-oak forest, in secondary vegetation, along the road; thorn scrubland; crop fieds; 1150–2750 m.

Specimens examined:—CHIHUAHUA: 13 May 1994, Alrededores de Chihuahua*, E. Estrada 2485* (NY); *18 May 1994,* Km 58 Carr. Bachíniva-Alvaro Obregón, *E. Estrada 2502 y G. Quintana* (NY); 5 May 1959, North of San Francisco del Oro, *D. S. Correll 21507, I. M. Johnston* (ENCB). **COAHUILA:** 10 July 1880/13 July 1880, Parras, 111.5 mi W of Saltillo*, E. Palmer 240* (NY); 19 August 1974, 18 April 1905, Collected at Saltillo, Agua Nuevo*, E. Palmer 559* (NY); 7.3 mi. W of Fraile, *R. Spellenberg 3789, J. Syvertsen* (NY); 1/9 September 1938, Road from Saltillo south to Concepcion del Oro, grassy Bahada, infrequent, *I M. Johnston 7274* (US). **DURANGO:** 22 October 1985, Potrero La Doncella, Rancho EL Ojo, Mpio. Guadalupe Victoria, *Y. Herrera 809* (CIIDIR); 1 July 1984, Potrero La Doncella, Rancho El Ojo, Mpio. Guadalupe Victoria, *Y. Herrera A. 401* (CIIDIR, ENCB); 24 March 1992, Cerro El Oso, pendiente Sur, *A. García A. 1244, J. Nocedal* (CIIDIR, MEXU); 14 April 1981, Mirador El Fortín. Por el camino a La Michilía, *S. González 1573* (CIIDIR, ENCB, IBUG, MEXU, TEX-LL); 1 July 1984, Potrero La Doncella, Rancho El Ojo, *S. González 2825* (CIIDIR, ENCB, MEXU); 10 July 1984, Mirador El Fortín, Mpio. Súchil, *C. González, S. Acevedo 107* (CIIDIR); 3 April 1976, km 85 carretera Lerdo-Durango, *J. A. Acosta s.n.* (ANSM); IV-1906, At Tepehuanes*, E. Palmer 14* (NY); 4 April 1970, Just S of La Zarca on Hwy. 45, *Wm. F. Mahler 5715, J. W. Thieret* (NY); IV–VIII, 1896, Collected at Santiago Papasquiaro*, E. Palmer 49* (NY); 6 March 1985, 9.5 km al SW de Suchil, Brecha a la Michelia, *P. Tenorio L. 8052, C. Romero* (CAS, MEXU); 19 March 1983, 3–5 km al oeste de La Soledad, 11 km NW Santiago Papasquiaro, *R. Corral D. 110* (MEXU, NY). **GUANAJUATO:** 2 March 1985, Mpio. Dr. Mora, afueras del pueblo en la parte NE, camino a la Presa Melchor Ocampo, *E. Estrada L. 431* (CIIDIR, ENCB); 4 August 1989, El Dorado, 6 km al Oeste de Pozos, *E. Ventura 6979, E. López* (CIIDIR, IBUG, MEXU); 12 June 1990, Ojo de Agua*, E. Ventura 8083, E. López* (CIIDIR, MEXU); 31 July 1991, La Merced, carr. Pozos-San Jose Iturbide, *E. Ventura 9362, E. López* (CIIDIR, MEXU); 28 June 1987, 3 km al W de Pozos, sobre la carretera a la autopista, *Rzedowski 43503* (CIIDIR, ENCB, IBUG); 28 August 2003, Carretera Querètaro-San Luis Potosì, Km 108, "La Granja", *Morales Yépez s.n.* (ANSM); 16 June 1971, Mexico Highway 57 about 15 mi. N of San Luis de la Paz, along road shoulder, *R. Spellenberg 2596, R. C. Moore* (ENCB, NY); 13 April 1963, Carretera Central ± 10 km. al Norte de San Luis de la Paz Guanajuato, *A. Gómez 833* (NY); 17 July 1990, La Mina Grande de Pozos, *E. Ventura, E. López 8301* (ENCB, IBUG, MEXU); 13 March 1978, Mpio. Dr. Mora, 22 km al W del Pueblo en la orilla de la Presa La Cebada, *E. Estrada L. 63* (ENCB); 2 October 1988, 8 km al Noreste de San Luis de la Paz, *E. Ventura 6013, E. López* (ENCB); 11 July 2000, 14 km al N de San Pedro Almoloyan, Mpio. San Felipe, *E. Carranza 6078, J. Becerra* (ENCB). **HIDALGO;** III-1953, Cerro del Estudiante, cerca de Ajacuba, *L. Paray 732* (ENCB); 24 June 1981, 4 km al E de Tlaxiaca, Mpio. Tlaxiaca, *R. Hernández M. 6150* (ENCB); 13 July 1967, 20 km al E de Ixmiquilpan, *L. González Q. 3746* (ENCB); 8 August

1988, lanicia de Tulancalco, camino de terracería rumbo a la estación del ferrocarril "El rosal", aprox. a 1 km de la carretera pavimentada que va a Ajacuba, ejido San Nicolás Tecomatlán. Poblado Emiliano Zapata, *I. Díaz V. 369, J. Vilchis, A. Díaz V.* (ENCB); 1 September 1991, Cantamayé, (Orizabita), Mpio. Ixmiquilpan, *S. Rangel 97* (ENCB); 5 September 1980, Buena Vista, 5 kms. al sur de Sto. Tomás, 23 kms. al norte de Tepeapulco, *R. Hernández M. 4606* (ENCB); 12 June 1977, San bartolo, 2 km al W de Pachuca, Mpio. Pachuca, *M. Medina C. 2016* (ENCB); 29 June 1975, 2 km al SE de La Reforma, Mpio. La Reforma, *M. Medina C. 489* (ENCB); 29 August 1965, Venta Prieta, 5 km al S de Pachuca, sobre el camino a Tizayuca, *Rzedowski 20551* (ENCB); 2 July 1979, Tepeyahualco, Mpio. Zempoala, *R. Hernández M. 3278* (ENCB); 3 September 1967, 1.5 km al W de Zapotlán de Juárez, *R. Cruz C. 1805* (ENCB); 11 July 1966, Cerro de Santa Mónica, 40 km N de Apam, on Pachuca Hwy, NW slopes, *R. C. West P-2* (ENCB); 15 October 1978, *G. Gómez Ch. 93,* Mpio. Tlanalapan,6 km al N de Tlanalapan, (ENCB); 1 August 1976, Cerro de Los Pinos, Mpio. Zempoala, *A. Ventura A. 1951* (ENCB); 6 May 1981, Santa María Tecajete, 8 km al N de Zempoala, *R. Hernández M. 5941 et al.* (ENCB); 1 July 1978, 0.5 km al N de Pachuquilla, Mpio. Pachuquilla, *M. Medina C. 2142* (ENCB); 6 May 1981, 2 km al S de Epazoyucan, Mpio. Epazoyucan, *R. Hernández M. 5966 et al.* (ENCB). **JALISCO:** 13 June 1942, Cañada La Colorada, Vaquerias, *C. Díaz L. 13642* (ANSM); 15 August 1958, High plains near Km. 18, southwes of Ojuelos on road to Aguascalientes*, R. McVaugh 16981, H. F. Loveland, R. W. Pippen* (CAS, MEXU, NY); VII-2000, Mpio. Ojuelos, Rancho Las Papas de Arriba, *V. Rosas 21* (IBUG); 9/11 October 2005, Nopalera silvestre "La Jaula", Carretera Ojuelos-San Luis, *L. A. García R. 1380* (IBUG, IEB); 15 May 1999, Rancho La Campana, camino a la torre de micoorndas, *P. Carrillo R. y L. Ortíz C. 793* (IBUG, IEB); 11 September 1999, Rancho Papas de Arriba, aprox. 4.5 km al NO de Guadalupe Victoria, *P. Carrillo R. M. Harker 965* (IEB, MEXU); 25 September 1962, 3 km al E de Ojuelos, *Rzedowski 16111* (ENCB); 23 September 1980, Mpio. Ojuelos, Mesa El Tulillo, Vaquerías, *H. Gutiérrez C. 116* (ENCB); 10 September 1960, 16 miles E of Ojuelos de Jalisco *B. C. Templeton 8765* (ENCB). **MEXICO CITY:** 23 May 1904, *C. G. Pringle* 11953 (CAS). **NUEVO LEÓN:** 28 May 1987, Tanque Solis*, G. B. Hinton 19128* (CIIDIR, ENCB, IEB, MEXU, TEX-LL); 22 July 1995, Rancho Aguililla, Mpio. Galeana, *Hinton et al. 25364* (ANSM, IEB, TEX-LL); 27 July 1983, S.J. Las Joyas*, Hinton et al. 18548* (ANSM, ENCB, MEXU, TEX-LL); 27 July 1989, 8 km. al Oeste del Ejido Pablillo, Galeana, N. L., *E. Estrada 1617* (MEXU, NY, TEX-LL); 17 August 1938, Hacienda La Jolla on Cerro Potosi, *Students of the University of Illinois 1006* (NY); V-1903, Boca del Refugio, San Pablo*, G. S. Hinton 21901* (NY); *n.d.*, Cerro Potosí, *R. Schneider 1006* (US); 11 May 1980, Near San Pablo, Mpio. Galeana, *Hinton 17770* (ENCB). **PUEBLA:** 25 August 1975, Laguna de Alchichica, Alchichica, *M. Vázquez 2044* (ANSM); 12 August 1901, Foothills of Mt. Orizaba above Chalchicomula*, C. G. Pringle 8565* (NY); 24 July 1901, Near Calchicomula*, J. N. Rose, 5663, R. Hay* (NY, US); 30 July 1977, 0.4 mi S of San Antonio Atzitzintla; ca. 6 mi NE of Esperanza. Small hills S of Pico de Orizaba. SE-facing rocky slopes, *E. Letho L21873* (NY); 11 July 1970, Alchichica cerca de la laguna, *F. Ventura 1590* (CAS, ENCB, NY, TEX-LL, US); VIII-1905, Esperanza*, C. A. Purpus 3051* (NY); 1 June 1969, Ca. 5 mi. E of San Salvador el Seco at end of side rd. to N leading to the village Tecuitapla, inside old volcano with a lake in bottom, sides very steep, *G. J. Breckon 837* (NY); 17 September 1982, Alchichica, *F. Ventura 19748* (ENCB, MEXU, NY); 11 August 1979, Road to Seradan off Toll Road*, D. Dunn 23309, D. Thurm, S. Trott, C. Dziekanowski, P. Case* (MEXU, NY); 11 August 1979, Near Laguna Tolancingo, W of Zacatepec, *D. Dunn 23346*; *D. Thurm, S. Trot, C. Dziekanowski, P. Case* (NY); 21 July 1966, Lago Crater Atitzcac Basalto y Tufoides, *W. Boege 182* (CAS, MEXU); 8 April 1966*,* Lago Atitzac, *W. Boege 52* (CAS, MEXU); 11 August 1979, Near Laguna Tolancingo, W of Zacatepec*, D. B. Dunn 23346, D. Thurm, S. Trott, C. Dziekanoski, P. Casa* (NY); 12 August 1901, Foothills of Mt Orizaba above Chalchicomula*, C. G. Pringle 8565* (US); 5 September 1963, 5 miles NW of Zacatepec, Volcanic cerro sand, *Gentry 20426, Barklay, Argüelles* (US); 13 May 1990, Carretera de Tecamachalco a Tehuacán, esquina con la deviación a San Simón Tehualtepec, *H. Vibrans 3068* (ENCB, IBUG); 20 August 1998, Al S de San Luis Atexcac, cerca de la Laguna de Atexcac, *G. Castillo C. 18049, S. Avendaño R., R. A. Palestina G.* (IEB, MEXU); 27 June 1989, 4 km al NE de la caseta de cobro de Esperanza, *P. Tenorio L. 15870* (MEXU); 21 April 2005, Cerro al E de Aljojuca, *J.L. Contereras 8268* (MEXU); 22 June 1976, Teotlalco, en el Mal Pais, Carretera para Tepeyahualco, *J. I. Calzada, F. Lozano 2488* (MEXU); 3 August 1978, En el Potrero Ruiz, al N del Volcán de Pizarro, *J. I. Calzada, F. Lozano, E. Martínez 4616* (MEXU); ¿ June 1974, El Carmen Tequexquitla, *A. Vargas 1379, S. Ochoa* (ENCB, MEXU); 3 August 1979, En el Potrero Ruiz, al N del Volcán de Pizarro, *J. I Calzada et al., 4616* (ENCB); 30 July 1966, Lado norte de la Laguna de Alchichica, cerca de Perote, *G. Guerra 1* (ENCB); 21 March 1980, Parte sureste de la Laguna de Alchihchica, Mpio. Tepeyahualco, *S. Acosta 453* (ENCB); 17 September 1977, Bordes del cráter que contiene la Laguna de Quechula, Alchichica, *M. Chazaro 647* (ENCB). **QUERÉTARO:** 25 September 1978, 1 km al S de Vizarrón*, S. Zamudio R. 3379* (CIIDIR, IBUG, MEXU); 22 August 1905, Collected near Cadereyta*, J. N. Rose 9756, J. H. Painter, J. S. Rose* (NY); 9 June 1983, 1 km al sur de San Javier, Mpio.. Cadereyta, *R. Fernández N. 1600* (IBUG, MEXU, TEX-LL); 12 July 1995, Brecha San Javier Chavarrias, Mpio. Cadereyta, *R. Hernández M. 11310, J. Orozco H., C. Orozco L.* (ENCB,

IEB). **SAN LUIS POTOSÍ:** 9 June 1987, Laguna de Salinas, Mpio. de Salinas, *F. Sánchez B. s.n.* (ANSM, ENCB); 8 April 1965, San Josè de Gòmez, Mpio. Villa Zaragoza, *G. González, J. Villa s.n.* (ANSM); 13 April 1963, Carretera Central ± 10 km. al Norte de San Luis de la Paz Guanajuato, *A. Gómez G. 833* (NY); 24 May 1962, 4 km al norte del Tepetate Villa de Arriaga, *A. Gómez G. 641* (ENCB, NY); 22 October 1961, Villa de Arriaga, *A. Gómez 272* (ENCB, NY); 23 April 1963, Carretera Central ± 10 km. al Norte de San Luis de la Paz Guanajuato, *A. Gómez 838* (ENCB, NY); 14 July 1961, Rancho San Miguel 40 km al W de Charcas San Luis Potosí, *A. Gómez 164* (ENCB, NY); 24 May 1962, 4 km al norte del Tepetate Villa de Arriaga, *A. Gómez 641* (NY); 29 May 1962, Entre Santo Domingo y Salinas, *A. Gómez 652* (ENCB, NY); 12 September 1973, Mpio. Moctezuma, 28 km al E de Salinas, *R. Banda, BF 105* (CAS); VII August 1934, Charcas, *C. L. Lundell 5086* (US); 2 November 1993, Monte Caldera, Mpio. De Cerro de San Pedro, *F. García S. s.n.* (IBUG); 11 August 1970, Ejido de Los Remedios, Mpio. de Venados, *A. Gómez s.n.* (ENCB); 5 August 1954, Viulla de Arriaga, *Rzedowski 3360* (ENCB); 5 July 1957, Sierra de Canoas, 25 km al W de San Luis Potosi, *Rzedowski 9161* (ENCB); 7 September 1975, Mpio. Villa de Santo Domingo, Rancho Morelos, 15 km del Centro Ovino "Juan Sarabia", al W de Charcas, camino de mano de obra *N. Becerra n.n* (ENCB); 4 September 1974, 2 km antes de San Juan El Salado, por el camino Sierra Vieja-Santo Domingo, Mpio. Santo Domingo, *R. Banda 45, J. Villa* (ENCB); 18 July 1974, Hacienda de Guadalupe, Mpio. Salinas, *P. Chico L. s.n.* (ENCB). **STATE OF MEXICO:** 21 January 1951, HAB. Valle de México C. de Los pinos, *E. Matuda 20921* (MEXU); 30 September 1982, San Francisco, Mpio. Tultepec, *E. Ventura V. 4125* (CIIDIR, ENCB); 22 October 1950, Valle de Mexico, Chimalhuacan, *E. Matuda 18388* (NY); 1901, Collected in the Valley of Mexico, *J. N. Rose 5641, R. Hay* (NY); 22 October 1950, Valle de Mexico, Chimalhuacan, *E. Matuda 18538* (ENCB, MEXU, NY); 27 April 1976, Ahuatepec, *A. Ventura 1363* (ENCB, MEXU, NY); 18 July 1965, cerca de Totolcingo, *Rzedowski 20216* (CAS, ENCB, MEXU, TEX-LL, US); 20 July 1967, 3 km al E de Coatlinchán, Mpoio. Texcoco, *Rzedowski 24094* (CAS, ENCB); 3 April 1966, Alrededores de Atlahutenco, Mpio. De Ecatepec de Morelos, *R. Cruz C. 507* (CAS, ENCB); 13 July 1967, Vertiente E del Cerro El Pino, cerca de Ayotla, *Rzedowski 23967* (CAS, ENCB); 11 August 1971, 3 km al SE de Huehuetoca, sobre el camino a Teoloyucan, *Rzedowski 28373* (CAS, ENCB); 12 March 1956, Open ground at Sierra de la Estrellas, 2 miles south of Churubusco, Mexico City, *O. N. Gunnison 4132* (US); 19 June 1977, parte SW del Cerro del Pino, *Rzedowski 34794* (ENCB, IEB, MEXU) 18944; 25 June 1950, Sn. Juan Teotihuacán, Valle de México, *E. Matuda 18944* (MEXU); 21 October 1972, Parte oriental Cerro EL Pino, Mpio. Ixtapaluca, *R. Piza B. 60* (ENCB); 9 March 1976, Otumba, San Marcos, *A. Ventura A. 1123* (ENCB); 5-II-1967, Ladera E del Cerro El Pino, al N de Ixtapaluca, *M. Villegas s.n.* (ENCB); 27 November 1982, Tizayuca, Mpio. Tizayuca, *A. Ventura A. 4178* (ENCB); 29 March 1981, Cerro del Pino; parte alta, *Rzedowski 37225* (ENCB); 21 June 1975, Otumba, San Marcos, *A. Ventura A. 6* (ENCB); 4 April 1981, Km 33 de la carretera federal 132 , Mpio. Otumba, *M. Castilla 1185, D. Tejero 1185* (ENCB); 13 July 1967, Vertiente E de Cerro El Pino, cerca de Ayotla, *Rzedowski 23968* (ENCB); 3 October 1976, Parte baja del Cerro del Pino, Mpio. Ixtapaluca, *J. L. León 26* (ENCB); 15 September 1966, Cerro del Pino, 3 km al NNE de Ixtapaluca, *R. Cruz C. 1188* (ENCB). **TLAXCALA:** 9 August 1984, Mpio**.** Tlaxcala, San Juan Bautista, Ixtenco, 10–14 km al Volcán La Malinche, *Y. Ramos G. s.n.* (MEXU). **VERACRUZ:** *1855,* Orizaba, *Müller 514* (NY); 12 November 1976, 2 km al NE de Totalco, *L. Rico 32, O. Téllez, R. R. Rogel, R. Omaña, R. Valdéz* (CAS, MEXU); 19 May 1975, 4 km al N de Alchichica, Mpio. Totalco, *M. Vázquez T. V-1980* (ENCB); 15 June 1971, Near Puebla highway 0.5 mile from Alchichica, on hwy 140, *R. Spellenberg 2593, R. C. Moore* (ENCB). **ZACATECAS:** 17 July 1978, Rancho La Alianza (Fermín Rivera), *E. Mellink 13* (CIIDIR); 19 April 1966, aprox. 10 km al sur de Tecomate, Mpio. Los Pinos, *A. Torres F. s.n.* (ANSM); 28 March 1973, 7½ km. by road WSW of Caopas on road to Camacho, *M. C. Johnston, F. Chiang. T. L. Wendt 10451F* (CAS, TEX-LL); 20–22 July 2004, Comunidad El Rayo, nopalera cultivada, *L. A. García-R. 740, 741, 773* (IBUG): 19 April 1966, 10 km al S del Tecomate, Mpio. Pinos, *A. Torres F. n.n* (ENCB); 15 April 1982, Santa Cruz de la Trecias, Mpio. Sombrerete, *M. Márquez s.n.* (ENCB).

60. ***Astragalus moranii*** Barneby, Brittonia 28: 278. 1976

Type:—MEXICO, Baja California, gravelly flats in pinyon woodland, 1900 m, summit of Cerro Jamau, 7 km S of Portezuelo de Jamau, S end of Sierra Juarez, 20 April 1974, R. Moran 21231 (holotype: SD: 00000258 digital image!; isotype: RSA0003025 digital image!, SD: 00000258 digital image!, MEXU00284717!, US00004220 digital image!, MO-121512 digital image!, ENCB003333!, UC1445025 digital image!, NY NY00005813!).

Perennial; Stems up to 30 cm long, diffuse to decumbent or incurved-ascendant, pubescence subapressed, the trichomes up to 0.5 mm long. **Stipules** 1.5–4.5 mm long, semi-clasping, decurrent, not connate, triangular, sometimes with purple

tones **Leaves** 4–10 cm long, leaflets 9–19, 4–18 mm long, elliptic to oblong, minute mucronate, rarely subtruncate, adaxially glabrate o subglabrate adjacent to midvein, pale green. **Peduncles** 4.4–12.8 cm long, ascendant, humistrate with age; the racemes 1.5–4 cm long, flowers 8–17. **Flowers** purple, blue-violet, turning blue when drying; the calyx 3.2–4.8 × 2.2–2.8 mm, strigose, the trichomes white and black mixed, the tube 2.5–3.6 mm long, campanulate, the teeth 0.8–1.3 mm long, subulate, widely separate by the sinus; the banner 8.5–9 × 6.5–7.2 mm, rhombic to ovate, obtuse, recurved; the wings 7.4–8.3 × 2.5 mm, the claw 2.7–3.3 mm long, the blade 5.2–5.7 mm long, oblong to obovate; the keel 7–8.2 × 2.5–2.6 mm, the claw 2.5–3.3 mm long, the blade 4.9–5.3 mm long, elliptic. **Pod** elevated (above the receptacle by an strigose gynophore, 3–4 mm long), ascendant, 1.6–2.6 × 1.2–2.2 cm, ovoid to elliptic, sub-simetric, inflated bladder-like, basally slightly narrow, distally ending in a contracted, triangular, incurved beak, the valves membranous, papery, pale-bronze to ochre, semi-translucid, softly reticulate, septum absent; ovules 20–24; seeds 2.8–3.3 mm long, mitten shaped, brown with purple tones, opaque.

Distribution:—Endemic to Mexico, restricted to the southern Sierra Juárez, Baja California (Cerro Taraizo, Cerro 1905, Cerro Saiz, El Rincon Canyon, 2.5 km NW Cerro Jamau) (Fig. 18).

Habitat:—Volcanic, clayey, and gravel soils; open areas; chaparral, associated with *Quercus, Pinus, Artemisia, Juniperus, Rhus, Rhamnus*; 1440–2000 m.

Comments:—The Sierra Juárez and surrounding areas host nine species of *Astragalus* (*A. circumdatus, A. coccineus, A. didymocarpus, A. filipes, A. moranii, A. orcuttianus, A. palmeri, A. proriferus* and *A. trichopodus* var *lonchus*). Of these, only four (*A. moranii, A. proriferus, A. palmeri,* and *A. trichopodus* var. *lonchus*) have inflated pods, bladder-like, with true stipitated pods or sometimes, the pods raised in a very small 0.4–0.5 mm long gynophore. *Astragalus trichopodus* var. *lonchus* possess a true or continuous stipe with the fruit, whereas *A. moranii, A. palmeri* and *A. proriferus*, the pod is elevated above the receptacle by a gynophore (articulated structure, not continuous with the pod, it breaks in the base of the fruit and separates from it when it matures). *Astragalus proriferus* and *A. palmeri* have shorter gynophore (0.4–0.7 mm long).

Specimens examined:—BAJA CALIFORNIA: 20 April 1974, S of Portezuelo de Jamau, summit of Cerro Jamau, S end of Sierra Juarez, *R. V. Moran 21231* (MEXU, NY); 2 May 1976, Volcanic mesa atop Cerro Taraizo ([unsure placement] = San Matías), *R. Moran 22987* (ENCB, MEXU, NY, US); *23 May 1976,* Fairly common in open areas on gravelly flat on west side just below summit of Cerro Jamau, *R. Moran 23268* (NY, TEX-LL, US); 4 July 1976, Sierra Juárez, north fork of Cañada el Rincón*, R. Moran 23598* (NY); 24 May 1976, Sierra Juárez, upper tributary of Arroyo la Esperanza, 2½ km NW of Cerro Jamau, *R. Moran 23275* (NY); 23 May 1976, Sierra Juárez, on north slope of Cerro Saiz*, R. V. Moran 23252* (NY).

61. *Astragalus nothoxys* A. Gray, Proc. Amer. Acad. Arts 4: 232. 1864

Type:—USA, Arizona, San Luis Mountain and Guadeloupe Canon, 1851, *Thurber s.n.* (holotype: NY00005814!; isotype: NY01268197!; syntype: *E. K. Smith s.n*. GH00058846 digital image!; isolectotype: *Thurber s.n.* GH00058845 digital image!).

Tragacantha nothoxys Kuntze, Revis. Gen. Pl. 2: 946. 1891.—*Oxytropis nothoxys* M. E. Jones, Proc. Calif. Acad. Sci. ser. 2, 5: 677. 1895.—*Spiesia nothoxys* M. E. Jones, Proc. Calif. Acad. Sci. ser. 2, 5: 677, in syn. 1895.—*Aragallus nothoxys* A. Heller, Cat. N. Amer. Pl. 4. 1898.—*Hamosa nothoxys* Rydb., Bull. Torrey Bot. Club 54: 330. 1927.

Astragalus madrensis M. E. Jones, Rev. N.-Amer. *Astragalus* 274. 1923; *Hamosa madrensis* Rydb., N. Amer. Fl. 24(7): 426. 1929; *Hamosa gooddingii* Rydb., Bull. Torrey Bot. Club 54: 20. 1927; *Astragalus gooddingii* Tidestr., Proc. Biol. Soc. Washington 48: 40. 1935.

Perennial, sometimes of short duration**. Stems** up to 40 cm long, weak, prostrate or ascending distally, strigose to green-glaucos, trichomes up to 0.5 mm long, sometimes purplecolored basally. **Stipules** 1.5–5.8 mm long, semi-clasping, not connate, triangular to lanceolate, sometimes pale purple. **Leaves** 2–11.5 cm long, leaflets 7–21, 2–15 mm long, ovate, elliptic, oblanceolate, wide-oblong, obovate to elliptic obovate, rarely some leaflets suborbicular, obtuse to mostly retuse, glabrate or almost so. **Peduncles** 3–15 cm long, ascendant to incurved, pendulous with age; the racemes 0.4–9 cm long, flowers 4–25. **Flowers** pink-lavender, pink, purple, rose-purple, turning blue when drying, sometimes the banner red-violet and basally white, sometimes with white tones in different parts; the calyx 5–7 × 2.1–3 mm, cylindric to cylindric-campanulate, strigose, trichomes white o white and black mixed, the tube 3.2–4.9 mm long, frequently purple, the teeth 1.4–2.7 mm long, subulates; the banner 8.5–12 × 5–7.7 mm, ovate to obovate, basally cuneate, subtruncate to retuse; the wings 8.5–11 × 1.7–3.6 mm, the claw 3.3–4.8 mm long, the blade 5.5–7.7 mm long, oblanceolate, oblong to obovate; the keel 6.8–8.4 × 1.2–2.3 mm, the claw 3.3–4.4 mm long, the blade 3.3–5.2 mm

long, markedly incurved, almost in straight angle, distally acute. **Pod** ascendant, 13–22 × 2–6 mm, sessile o minute elevated above receptacle, linear to lanceolate, triquetrous (rarely the pod dorsoventrally compressed to somewhat bulged, wide-elliptic to wide-oblong, ventrally carinated, incurved, rounded at both ends, but with a small, narrow triangular), but its lateral faces not concave, but convex or little so, distally contracted in a short triangular beak, with the angles obtuse, dorsally narrowly sulcate, the valves papery, ochre to brown, strigose, softly reticulate, septum complete or almost so, the pod thence bilocular or almost so, apically ending in a 1–2 mm long beak, the valves stiffly papery, tan or light-brown, finely and perpendicularly reticulated, tiny and scattered pubescent, densely pilose with white trichomes, fully bilocular basally rounded; ovules 16–26; seeds 1.8–2.9 mm long, brown to dark brown, mitten shape, sometimes with purple tones, wrinkled, somewhat opaque.

Distribution:—Northwest Mexico; Sonora and Chihuahua. In Sonora, from northwest in Santa Ana and Magdalena, through Nogales, Cananea, and Naco to Aguaprieta and in the vicinity to Chihuahua, southeast, at the height of Yécora. In Chihuahua, from Casas Grandes, through Buenaventura, Gómez Farías, Namiquipa to Guerreo, La Junta and Cuauhtémoc. Also, in New Mexico and Arizona (USA) (Fig. 18).

Habitat:—Slopes with volcanic soils; stony, clayey and flooded soils; sand in wash; oak-mezquite-grassland; associated with overgrazed grasslands; grasslands with *Prosopis-Quercus*; oak forest; disturbed areas; desert shrubland with *Acacia, Prosopis, Yucca, Gutierrezia, Opuntia*; *Quercus-Pinus-Juniperus* forest; riparian areas with *Salix*; pine-oak forest; streams; 1287–1981 m.

Comments:—In these areas, where several ecosystems converge, at least 18 species of *Astragalus* are reported, but only five of them have simple trichomes, clasping or semi-clasping stipules and triquetrous sessile pods (*A. gentryi, A. hartwegii, A. nothoxys, A. nuttalllianus* and *A. pringlei*). *A. nuttallianus* can be distinguished by its few-flowered racemes (1–7); *A. hartwegii* is differentitated by its small calyx (3.2–4.8 mm); *A. nothoxys, A. pringlei* and *A. gentryi* can be discerned based on certain particular characters. *Astragalus gentryi* has irregularly graduated petals, the apex of the keel equals or surpasses the wings lenght, in the other two species, the wings are longer than the keel. *Astragalus pringlei* has leaves (1.5–4.5 cm) and peduncles (0.5–5.5 cm) shorter, the racemes with fewer flowers (3–12) and pod shorter (7–11 mm long).

Specimens examined:—CHIHUAHUA: 24 March 1975, 8.4 mi SW of Buenaventura*, R. Spellenberg 3990 &, M. Spellenberg* (NY); 12 April 1891, Puerta de St. Diego*, C. V. Hartman 622* (NY); 11 September 1903, San Diego Canyon*, M. E. Jones s.n.* (CAS, NY). **SONORA:** 19 March 1984, Along Highway 2, ca. 26 miles east of Agua Prieta and ca. 24 miles west of the state line at Puerto San Luis, *A. C. Sanders 4719, W. Charlton, V. Way, McIntosh, Gibeau, Gould* (NY); 28 March 1997, Maycoba*, T. R. Van Devender 97-387, A. L. Reina* (CAS, MEXU, USON); *n.d.*, San Louis Mountains & Guadalupe Cañon*, E. K. Smith s.n.* (NY); 13 March 2000, *A. L. Reina, G. 2000-123B, T. R. Van Devender, R, A, Castillo G., M. A. Dimmitt* (USON); 6 April 2008, Mpio. Santa Cruz, Rancho Los Fresnos Grassland Preserv, Upper Rio San Pedro drainajeadjacent to US border, *B. Boyle 8092, D. Boss, K. Cranston* (USON); 25 March 2005, Isolated Hill NE of Sierra Anibácachi, Rancho la Calera, ca. 10 km by air, SW of Agua Fría, *T. R. Van Devender 2005-411, A. L. Reina G., M. Shieber, M. Klotz* (USON); 18 May 2010, 51.2 km by air, E of Agua Prieta, Cuenca Los Ojos, Foundation property, *A. L. Reina G. 2010-531, T. R. Van Devender* (MEXU, USON); 9 April 2003, 4.7 km southeast of Naco on road to Cananea, *T. R. Van Devender 2003-335, A. L. Reina, G. Anderson* (MEXU, USON); 15 April 2006, Mouth of arroyo along beach at Barril, 48 mi E of Pozo Aleman, *B. Boyle 7824, A. Estes, D. Hearn* (USON); 13 March 2000, Restaurant La Palmita, 9.5 km W Restaurant of Puerto de La Cruz on Mex 16 (Km 258 east of Cd. Obregón)north side of Mesa del Campanero, *A. L. Reina G. 2000-1238 et al.* (USON); 5 October 1996, 1.5 Km. al W de la Estación de Microondas del Cerro el campanero, *A. Flores M. 5061, J. Sánchez* (IEB, MEXU); 23 March 1979, 4 mi E of Yécora, *G. L. Webster 23845* (MEXU); 20 May 1987, Puerto Cananea 13 km al W de Cananea, *P. Tenorio L. 13545, C. Romero de T.* (MEXU); 9 April 2003, 4.7 km southeast of Naco on road to Cananea, *T. R. Van Devender 2003-335, A. L. Reina, G. Anderson* (MEXU); 22 May 1987, Desviación a Naco de la Carr. Cananea-Agua Prieta, *P. Tenorio L. 13618, C. Romero de T.* (MEXU); 20 May 1987, 10 km al S de Cananea, Carretera a Arizpe, *P. Tenorio L. 13583, C. Romero de T.* (MEXU).

62. *Astragalus nuttallianus* DC., Prodr. [A. P. de Candolle] 2: 289. 1825

Annual, short duration. **Stems** up to 45 cm long, single at base or several, suberect, erect or ascendant, glabrate, subglabrate, strigose or pilose, the trichomes up to 1.4 mm long, sub-appressed or almost extended. Stipules 1–9 mm long, semi-clasping to totally completely clasping, not connate, triangular, ovate to lanceolate. **Leaves** 1–8.5 cm long, leaflets 3–23, 2–17 mm long, linear, elliptic, oblong, oblong-elliptic to obovate, truncate, slight to distally

deeply retuse, sometimes dimorphic, the lowest ones more wide, adaxially glabrate or pubescent. **Peduncles** 1–10 cm long, straight or incurved; the racemes up to 3 cm long, lax, rarely subcapitate, flowers 1–27. **Flowers** white, rose, purple, pale purple, purple-white, sometimes, the banner white colored in the fold, turning blue or violet when drying; the calyx 2.4–5.8 mm long, subglabrate, dense villous or pilose, the tube 1.3–3.2 mm long, the teeth 1–3.2 mm long, lanceolate; the banner 3.5–13 mm long, recurved, suborbicular to obovate, basally cuneate, truncate or slightly retuse; the wings 3.6–10.7 mm long, oblanceolate; the keel 3.7–9.3 mm long, distally semi-obovate, lunate, rounded or triangular. **Pod** ascending, extended or pendulous, sessile, linear, linear-oblong, oblanceolate, straight slight to evidently curved, triquetrous, laterally somewhat compressed when young, dorsally slightly sulcate or turning flat or somewhat convex with age, the valves thin, papery, glabrate, strigose to villous, green, ochre, brown or black to purple, when ripen, finely reticulate, septum complete, the pod thence bilocular or the septum incomplete or almost absent, persistent, opening when maturing on the peduncle; ovules 2–17; seeds 1.3–2.7 mm long, mitten shape, ochre to olive-green, frequently with purple spots.

Distribution:—One of the species with the widest distribution in Mexico, inhabiting multiple ecosystems, along almost of the Peninsula of Baja California, except the southern part of Baja California Sur. In the north, from Sonora to Tamaulipas, from there to central Puebla.

Notes:—The most closely related species to *A. nuttallianus* is *A. emoryanus* var. *emoryanus*, both species have multiple morphological characteristics in common. They can be distinguished based on the form of keel apex, pubescence of the calyx teeth, leaflets form in some leaves and time of persistence of the pod in the racemes and the dehiscence, in *A. emoryanus* the keel apex is rounded or blunt, its leaflets are always blunt, obcordate or retuse, it never has elliptic or subacute leaflets, and the caducous pod opens only after it is on the floor.

A nuttallianus is composed of nine varieties (Barneby, 1964), some of them sympatric, others isolated and locally distributed, six of them occur in Mexico and are differentiated based on leaflet shape, pubescence, and calyx and teeth sizes as well as the ovary and pods pubescence.

1. Leaflets elliptic to ovate, obtuse to acute, sometimes some of them retuse 2
- Leaflets all retuse or truncate 5
2. Calyx trichomes appressed o slightlty ascendant, 0.3–0.8 mm long 3
- Calyx trichomes hispidous to ciliate, not appressed, 0.6–1.2 mm long 4
3. Leaflets elliptic, none retuse; calyx tube 1.9–2.8 mm long ..... **var. *imperfectus***
- Leaflets of basal leaves retuse, the ones of the upper ones elliptic and acute; calyx tube… 1.4–1.7 mm long ..... **var. *cedrosensis***
4. Pod hirsute, trichomes up to 1mm long; leaflets 11–13 ..... **var. *trichocarpus***
- Pod glabrate or strigose, trichomes 0.5 mm long or shorter; leaflets commonly 7–11 ..... **var. *austrinus***
5. Ovary glabrate ..... **var. *nutallianus***
- Ovary pubescent ..... **var. *zapatanus***

62.1. *Astragalus nuttallianus* DC. var. ***austrinus*** (Small) Barneby, Shreve & Wiggins, Veg. Fl. Son. Des. 709. 1964

Type:—USA, Texas, Rio Fronteras, June 1857, *Thurber 417* (holotype (based on *Hamosa austrina*): NY00011927!; isotype: GH00058662 digital image!, NY01268239 digital image!, GH00066162 digital image!).

Hamosa austrina Small, Fl. S.E. U.S. [Small]. 618, 1332. 1903; *Astragalus austrinus* (Small) E. D. Schulz, Wild Fl. S. Antonio 104. 1922.

Astragalus subuniflorus Greene, Leafl. Bot. Observ. Crit. 2: 42. 1910.—*Hamosa subuniflora* Rydb., Bull. Torrey Bot. Club 54: 328. 1927.

Hamosa davisiana Rydb., Bull. Torrey Bot. Club 54: 328. 1927.—*Astragalus davisianus* Greene ex Rydb., Bull. Torrey Bot. Club 1927.

Leaflets ovate to elliptic, obtuse to acute, never notched nor truncate apically; calyx trichomes hispid or ciliate, 0.6–1.2 mm long; calyx teeth 1.5–3 mm long; pod glabrate or strigose, the trichomes 0.5 mm long or shorter; leaflets usually 7–11.

Distribution:—The distribution of this variety encompasses almost the total distribution of the species in Mexico. From Sonora to Tamaulipas, south to the center of Puebla. Also, in New Mexico, Arizona, Texas and Oklahoma into USA (Fig. 19).

Habitat:—Limestone clayey, sandy, gravel, igneous and rocky soils; mahogany-juniper-ash association; microphyllous and thorny scrub; riparian forest with willow, agrito; pine forest; maritime deserts; roadside; pine-maple-oak-juniper forest; grassy palmar; creosote bush-mezquite association; oak forest; disturbed areas; crop fields; foothills thornscrub transition; 300–2000 m.

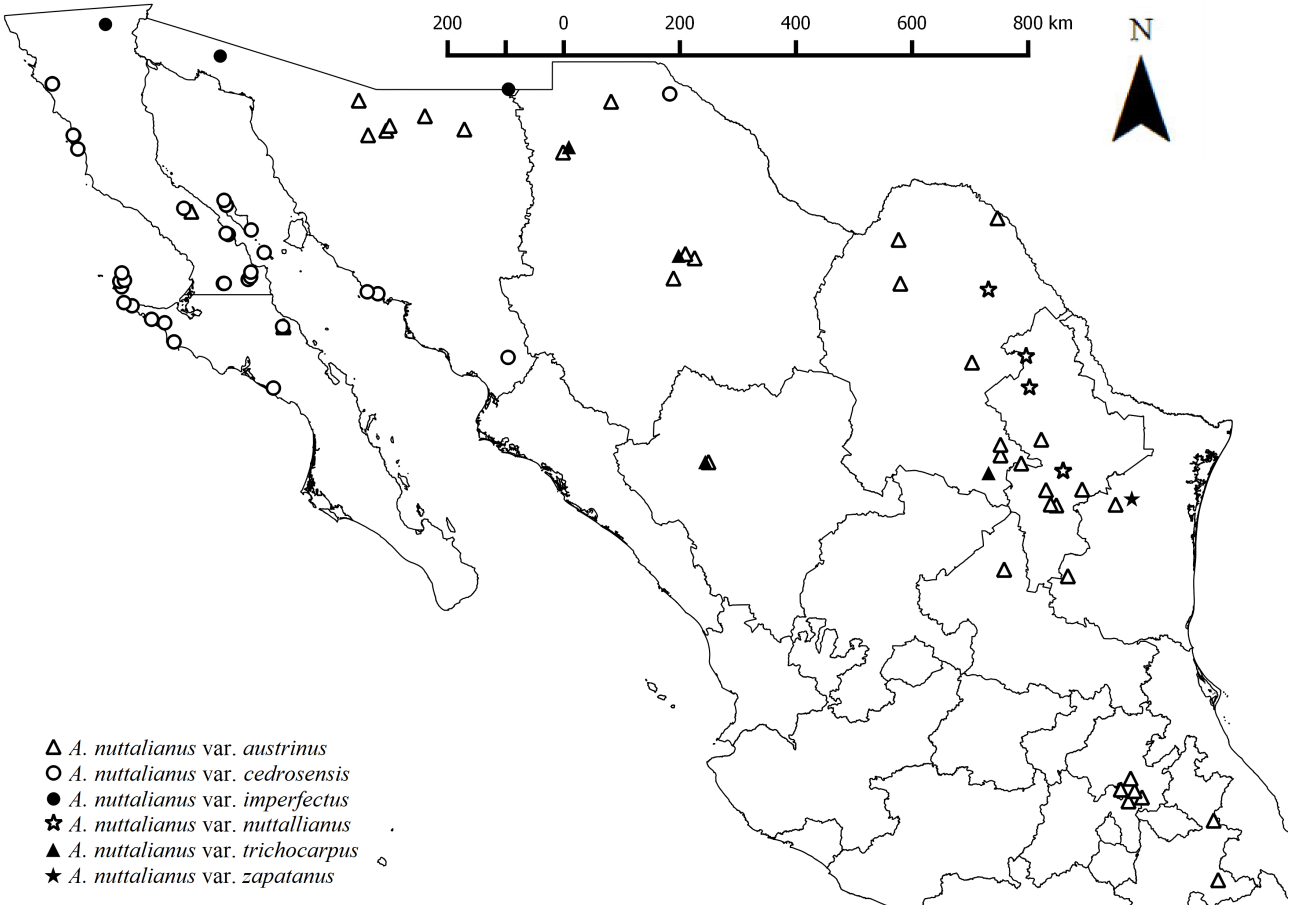

FIGURE 19. Map showing the distribution of *Astragalus nuttallianus* var. *nuttallianus, A. nuttallianus* var. *austrinus, A. nuttallianus* var. *cedrosensis, A. nuttallianus* var. *imperfectus, A. nuttallianus* var. *trichocarpus,* and *A. nuttallianus* var. *zapatanus* in Mexico.

Specimens examined:—BAJA CALIFORNIA: 1887, Los Angeles Bay, Golf of California, *E. Palmer 571* (US). **BAJA CALIFORNIA SUR:** 11 April 1973, Lower north slope of Volcán las Tres Vírgenes, *R. Moran 20401* (NY). **CHIHUAHUA:** 9 March 1997, Alrededores de Chihuahua, *E. Estrada 6889, C. Yen* (ANSM, MEXU); 9 March 1985, Wash, Canyon Mina Vieja. Sierra Santa Erlalia, *P. F. Zika 8503* (NY); 1852, Lake Santa Maria, *C. Wright 1360* (NY); 5 March 1997, 3.7 km e of Colonia Juarez in tinaja wash (Tapieitas), *N. D. Atwood 21610 y 21611, J. Spencer* (NY); 6 May 1959, Ojito Pass, 27 miles south of C. Chihuahua, route #45, *D. S. Correll 21577, I. M. Johnston* (NY); 1/21 May 1901, Vicinity of Chihuahua*, E. Palmer 171* (US); 14 April 1886, Plains near Chihuahua*, C. G. Pringle 853* (MEXU). **COAHUILA:** 26 April 2015, Oeste de la Sierra de Zapalinamé, 1.9 km al SE de la Colonia Parajes de Santa Elena, *J. A. Encina 4550, S. Guillermo R.* (ANSM, IEB); 29 May 1992, Rancho Florida, aprox. 100 km al SW de Múzquiz, rumbo a Boquillas del Carmen, carr. 53, Mpio. Múzquiz, *M. A. Carranza 1580, J. Noriega, L. García* (ANSM); 9 October 1993, Rancho Rincón de los Pastores, Mpio. Saltillo, aporx. 15 km a SW de Saltillo, *M. A. Carranza 1784, L. Zamora* (ANSM, CIIDIR, IEB); 6 April 1981, San Gregorio, por la Carretera Monterrey-Saltillo, Mpio. Ramos Arizpe, *A. Henández s.n., J. A. Villarreal* (ANSM, CIIDIR); 27 March 1992, Sierra del Carmen, Rancho Morteros y Rancho San isidro, , apor. 178 km de Múzquiz por la brecha Múzquiz-Boquillas del Carmen (Carr. 53), *M. A. Carranza 1342, J. Noriega, L. García* (ANSM); 18 April 1983, Rancho La Reforma, a 1 km al SW del Municipio de Guerrero, Chih. *R. Váquez 21, R. Pérez* (ANSM); not date, Rancho Experimental Ganadero Las Norias, Mpio. Acuña, *R. Vázquez A. 315* (ANSM); 29 March 1992, Sierra la Encantada, Cuesta Malena, apor. 170 km al NW de Múzquiz, brecha Boquillas del Carmen, *M. A. Carranza 1526, J. Noriega P., L. García* (ANSM); 28 March 1992, Sierra Maderas del Carmen, Rancho El Secadero, *M. A. Carranza 1379, J. Noriega P., L. García* (ANSM, MEXU); 28 April 1987, La Muralla, Carr. 57, límite de Ramos Arizpe con Castaños, *A. Rodríguez 806* (ANSM). **DURANGO:** 25-III/16 April 1906, Tepehuanes, *E. Palmer 26* (US). **HIDALGO:** 1 May 1973, Lordsburg Mesa, along Redrock-Duncan shortcut, 2.6 miles west of New Mexico Highway 464, 18 airline miles north of downtown Lordsburg, *N. H. Holmgren 7031, P. K. Holmgren* (NY); 20-XI-1976, Extremo NW de Pachuca, Barrio Las Peñitas, *M. Medina C. 1803* (ENCB); 23 October 1970, 0.5 km al W de Tolcayuca, base del Cerro al fondo de la población, *J. Espinoza 937* (ENCB); 15 October 1978, 6 km al N de

Tlalnalapa, sobre la carretera a Pachuca, *Rzedowski 35944* (ENCB); 4 August 1979, La Trinidad, Sierra de Los Pitos, Mpio. Zempoala, *G. Benítez 488* (ENCB). **NUEVO LEÓN:** 1 April 1987, Rancho El Popote, Linares, *E. Estrada 1022* (ANSM, MEXU); 27 July 1989, 10 km al Oeste del Ej. Pablillo, *E. Estrada 1618* (CFNL, NY); 13 November 1964, 6 miles w. of Galeana, *H. D. Ripley 13801, R.C. Barneby* (NY); 16/17 February1880, Monterrey, *E. Palmer 236* (US); 23 September 1973, Along Nuevo Leon Highway 68, 12.2 miles south of the junction of highway 60 and 1.5 mile south of Pablillo, about 139 miles north of Matahuala, Sierra Madre Oriental, on the lower foothills of densely forested slopes, *J. L. Reveal 3408a, N. D. Atwood* (US); 1900, Pico Chico near Monterey, *W. M. Canby 77, Sargent, Trelease* (US); 25 April 1981, Santa Rita, Mpio. Galeana, *Hinton 18184* (IEB); 23 March 1987, Monclova, *E. Estrada 764* (MEXU). **PUEBLA:** 20 February1984, Laguna El Salado, along dirt road 1.7 km W of Hwy. Mex. 140, 6 km. N of Laguna de Alchichica, *M. Nee 29581, K. Taylor* (MEXU, NY); 7 August 1897, Near Tehuacan, *C. G. Pringle 6678* (CAS, ENCB, MEXU, US); 20 February1984, Laguna El Salado, along dirt road 1.7 km. W of hwy. Mex. 140, 6 km. N of Laguna de Alchichica, *M. Nee, K. Taylor 29581* (MEXU). **SAN LUIS POTOSÍ:** 24 July 1934, Santa Ana, Above Potrero, Sierra De Catorce, Sierra Madre Oriental, Rocky limestone, west of Santa Ana, *F. W. Pennell 17547* (US)**. SONORA:** 5 March 1966, 5 km south of Imuris, *H. D. Ripley 14334* (CAS, NY); 21-II1966, Guaymas, Colonia Peninsular, *H. D. Ripley 14265* (NY); 14 April 1970, 4 mi NE of Magdalena on Hwy 15, *Wm. F. Mahler 6087, J. W. Thieret* (NY); 5 April 1932, 15 mi. W Magdalena, *F. R. Fosberg 7710* (MEXU, CAS); 5 May 1932, On densely brushy Hillside 1 mi. N. of Cedros, *I. L. Wiggins 6423* (CAS); 9 May 1948, Mountains 19.5 miles NE of Bacoachic on the road to Esqueda, *I. L. Wiggins 11724* (CAS, US); 20 March 2003, Campo Apache, Arroyo Las Carabinas, 48.7 km by air ENE of Nacozari de García, Sierra El Tigre, *T. R. Van Devender 2010-275, A. L. Reina G.* (USON); 6 April 2010, Rancho El Ariababi, Cordón de las Pilas, a 4.5 km by air al SE de la casa del Ranch, 22.4 km al ESE de Imuris, Mpio. Imuris, *A. M. Martínez A. 2010-001, L. T. Angulo, A. K. Enriquez G., J. M. Flores M., D. D. Parra G., D. Z. Ávila J., J. J. Sánchez E.* (USON); 12 May 2011, El Goteadero, Mpio. Tepache, Arroyo Montenegro, a10 km línea recta al SW de Tepache, *J. J. Sánchez E. 2011-392, D. Z. Ávila J., E. Salguero, R. Montaño* (USON); 14 March 2002, Sobre el Río Sonora, al lado del cauce active, Rancho El Tepiri, cerca del Río Sonora, Km 84 de la Carretera, Sonora 86, *J. Sánchez NF-247, L. Moreno M., E. Gómez* (USON); 12 March 2005, 1.3 km N of El Seguro (just SE of Rancho Vieno), flats south of Cerro La Posta, south Sierra de Mazatlán, *T. R. Van Devender 2005-135, A. L. Reina G., B. E. Loyola R.* (USON); 14 May 2002, Arroyo el Rilliuto, (San Bernardino, Black Draw), 25.3 km East Agua Prieta on Mex 2, *A. L. Reina G. 2002-273, T. R. Van Devender, K. Krebbs, G. Anderson* (USON); 20 May 1987, 10 Km al S de Cananea, Carretera a Arizpe, *P. Tenorio L. 13578, C. Romero de T.* (MEXU); 6 April 2005, Rancho La Sauceda, Sierra Ocotillo, 8.2 km (by road) west of Imuris, *T. R. Van Devender 2005-590, A. L. Reina* (MEXU); 1 April 1983, Tinaja Suvuk, Pinacate, Sonora, *E. Ezcurra n.n* (MEXU); 30 March 1988, 10 km SW of Sonoyta on Mex Hwy 8, *R. S. Felger 88-174, A. D. Zimmerman* (MEXU); 23 March 1978, C. 3.5 mi NE of Sáric, *G. L. Webster 22501, C. Teare* (MEXU); 9 March 2003, Arroyo Sásabe in Magdalen, *A. L. Reina G. 2003-169, T. R. Van Devender* (MEXU); 15 October 2010, Ánimas Valley, 58.7 km (byr air) E. of Agua Prieta, Cuenca Los Ojos Foundation property, *T. R. Van Devender 2010-406, A. L. Reina C. Roll* (MEXU); 1 March 1985, Bahia Algadones, ca 1 km N of Club Med, several miles northwest of Bahía San Carlos, *R. S: Felger 85-377, J. Hunter, J. Hunter* (MEXU). **STATE OF MEXICO:** 4 July 1981, Cerro Verde, Temascalapa, ladera sur, *M. Castilla 1350, D. Tejero* (ENCB). **TAMAULIPAS:** 8 October 1991, Sierra La Bufa de San Carlso, El Diente, Mpio. San Carlos, *E. Estrada 2149* (ANSM); 24 May 1976, 3 km al N de La Joya de Herrera, *F. González-Medrano 9113* (MEXU).

62.2. ***Astragalus nuttallianus*** DC. var. ***cedrosensis*** M. E. Jones, Rev. N.-Amer. *Astragalus* 270. Pl. 68, 1923

Type:—MEXICO, Baja California, Cedros Island, 18–20 march 1889, Palmer 692 (holotype (based on *Astragalus cedrosensis*)US: 00838929 digital image!; isotype: NY01268223!, NY00005815!, GH00059422 digital image!, US00838930 digital image!).

Astragalus cedrosensis Vasey & Rose, Contr. U. S. Natl. Herb. 1: 15. 1893.

Astragalus pertenuis Greene, Leafl. Bot. Observ. Crit. 2: 42. 1910.—*Hamosa pertenuis* Rydb., Bull. Torrey Bot. Club 54: 329. 1927.

Leaflets of two types on the same plant, those of the basal leaves retuse, the ones of the upper leaves elliptic or acute; calyx teeth 1–2 mm long, the trichomes appressed o slightly ascending, up to 0.8 mm long; calyx tube short, 1.4–1.7 mm long.

Distribution:—Distributed mainly on the Peninsula of Baja California. In Baja Californiafrom San Quintín (30°31'N–116°02'W) to El Batequi (26°25'N–112°46'W), also in the Cedros and Ángel de la Guarda (southern end) Islands. In Sonora, along the coast near San Carlos (27°58'N–111°04'W), isolated in northern Chihuahua (Juárez, 31°35'N–100°26'W). Also in California in the USA (Fig. 19).

Habitat:—Volcanic, saline, basalt, clayey, reddish, silt soils; canyons with *Pachycormus, Ambrosia, Simmondsia, Euphorbia,* scrublands with *Yucca, Opuntia, Pachycereus*; 460–500 m.

Specimens examined:—BAJA CALIFORNIA: 11 March 1998, Vizcaino Desert, north of El Arco, N of Calmalli, along road between Rancho Esperranza and Rancho Miramar, *J. Rebman 4874, N. Roberts* (BCMEX); 7 March 1889, San Jorge, *T. S. Brandegee 536* (NY); 1 May 1886, Northern Lower California, *C. R. Orcutt s.n.* (NY); 10 February1962, Rocky flat behind beach ridge, about 9 miles south of Puerto San Jose, *I. L. Wiggins, J. H. Thomas 191* (CAS, US); 16 March 1966, Las Lagunitas, *R. V. Moran 12699* (NY); 7 July 1980, SE side of Laguna Mormona 7 km NW of San Quintin nuevo, *R. Moran 28981* (CAS, ENCB, NY, TEX-LL); 17 March 1962, South end of Pond Island Bay, Angel de la Guarda Island, *R. Moran 8649* (MEXU, NY); 16 March 1966, Rancho Las Lagunitas*, R. Moran 12692* (NY); 10 April 1931, Rosario Wash, *I. L. Wiggins 5243* (CAS, US); 23 February1935, 24 miles S of Punta Prieta, *I. L. Wiggins 7740* (CAS); 16 February1962, Northwest end of Playa about 18 miles west of Bahia de los Angeles, 5 miles north of main road, *I. L. Wiggins, J. H. Thomas 299* (CAS); 18 March 1889/20-III1889, Cedros Island, *E. Palmer 692* (NY, US); 1887, Los Angeles Bay, Golf of California, *E. Palmer 571* (NY); 13 April 1949, 2–3 miles E of Punta Eugenia, Vizcaino Desert, *H. S: Gentry 8673* (MEXU); 15 March 1966, Peninsular divide at the Barril road*, R. Moran 12679* (NY); 1 March 1985, 10–20 km N of Puerto Santa Catarina on road to Rancho Santa Catarina, *D. E. Breedlove 62262* (CAS); 18/20 March 1889, Cedros Island, *E. Palmer 692* (MEXU). **BAJA CALIFORNIA SUR:** 7 February1973, Arroyo San José 3 miles west of San José de Castro, *R. V. Moran 19909* (NY); 14 February1973, Arroyo San José*, R. Moran 20131* (NY); 7 February1973, Arroyo San José 3 miles west of San José de Castro, *R. Moran 19909* (NY); 26 March 1984, Pacific slope of Sierra de Placeros 35 km SE of Bahia Tortugas, *D. E. Breedlove 60940* (CAS, MEXU, NY); 21 April 1987, 12 Km al NE de Bahía de Tortugas, brecha a Viscaíno, *P. Tenorio L. 12992, C. Romero de T.* (MEXU);. **CHIHUAHUA:** 31 March 1985, Sierra El Presidio, NW end of the Sierra near Mex. hwy., *R. D. Worthington 12897* (NY). **SONORA:** 24 February1933, Llano beside railway 9 mi. North of Torres, *I. L. Wiggins 6261* (CAS, NY); 21 February1966, Guaymas, Colonia Peninsular*, H. D. Ripley 14265* (NY); 18 May 1925, Alamos, 30 miles from Mag, *P. B. Kennedy 6999* (CAS); 24 February1966, N slope of sierra behind Guaymas, *H. D. Ripley 14292* (NY); 6 March 1979, Pitiquito, Ejido Vicotria y Libertad, *A. Castellanos, s.n.* (USON); 3 January 1995, Cañón del Nacapule, ca 4 km n of Bahía San Carlos, se side of Sierra del Aguaje, *R. S. Felger 95-1, S. Schneider* (MEXU, SD).

62.3. ***Astragalus nuttallianus*** DC. var. ***imperfectus*** (Rydb.) Barneby, Leafl. West. Bot. 3: 1009. 1942

Type:—USA, Nevada, Nye County, Rhyolite, 17 May 1909, *Heller 9637* (holotype (based on *Hamosa imperfecta*) NY00011921!; isotype: RENO009575 digital image!, PH00013580 digital image!).

Hamosa imperfecta Rydb., Bull. Torrey Bot. Club 54: 329. 1927.

Leaflets elliptic, none retuse; calyx teeth short, 1–2 mm long; the tube 1.9–2.8 mm long, the trichomes appressed o slightly ascendant, up to 0.8 mm long.

Distribution:—Northwestern Mexico, Baja California in northeastern (Cucupa Mts.), at El Mármol, 12 km N to Santa Ynés Ranch (29°53'N–114°51'W); in Sonora, isolated at the northwestern, adjacent to the Pinacate Volcano (31°46'N–113°26'W) and isolated also in San Carlos Bay (27°58'N–111° 04'W). Also, in Colorado, Utah, California, and Arizona (USA) (Fig. 19).

Habitat:—Adjacent to coastal dunes; gravel soils; bottom of canyons; stony plains; alluvial plains; desert scrubland; 1–420 m.

Specimens examined:—BAJA CALIFORNIA: 18 April 1905, Crater, Arrobrito, Cucapa Mts., *D. MacDougal 203* (NY), 24 February1973, Agua Dulce, *R. Moran 20260, J. L. Reveal* (NY); **SONORA:** 15 April 1992, Campo Rojo, east side of Pinacate volcanic field, *R. S. Felger 92-481B, S. W. Whitely* (MEXU, NY); 15 May 2010, Ánimas Valley, 58.7 km (byr air) E. of Agua Prieta, Cuenca Los Ojos Foundation property*, T. R. Van Devender 2010-406, A. L. Reina, C. Roll* (MEXU, USON); 23 March 1970, Mpio. Puerto Peñasco, ca. 0.5 km S of Pinacate Peak, Sierra Pinacate, *R. S. Felger 19310* (USON15 April 1992, Campo Rojo, east side of Pinacate volcanic field, *R. S. Felger 92-481B. S. W. Whitely* (MEXU).

62.4. *Astragalus nuttallianus* DC var. ***nuttallianus***

Type:—USA, Arkansa (sic), On the plains of Red River, cultivated in the garden of the University of Pennsylvania, not date, *Nuttall s.n.* (holotype: PH (not found); isotype: BM000795463 digital image!; lectotype: *G. Engelmann s.n.* MO-149254 digital image!;).

Astragalus nuttallianus DC., Prodr. [A. P. de Candolle] 2: 289. 1825.—*Hamosa nuttalliana* (DC.) Rydb., Small, Fl. S. E. U. S. 617: 1332. 1903.—*Astragalus nuttallianus* DC. var. *enneajugus* M. E. Jones, Contrib. W. Bot. 8: 22. 1898.—*Astragalus nuttallianus* DC. var. *quadrilaterlis* M. E. Jones Contrib. W. Bot. 8: 22. 1898.

A. micranthus Nutt., Jour. Acad. Philad. 2: 122. 1821 (non Desv. 1814) .—*Tragacantha micrantha* Kuntze, Revis. Gen. Pl. 2: 941. 1891.

Foliage dark-geen, the leaflets regardless of their shape, always all retuse or truncate and the ovary glabrate.

Distribution:—In Mexico, recorded in northeastern Coahuila (municipallity Sabinas) and northern Nuevo León (municipallity Villaldama). Also, in Oklahoma, Arkansas, and Texas into the USA (Fig. 19).

Habitat:—Rocky slopes; scrublands; acacia scrubland; oak forest; 1170 m.

Speciemens examined:—COAHUILA: 16 February1987, Carretera Roncesvalles.Barroterán, Mpio. Múzquiz, *R. Vázques s.n.* (ANSM, ENCB); 3 April 1969, 56 miles south of Eagle Pass, Texas*, E. Lehto 15774, Pinkava, Keil* (NY). **NUEVO LEON:** 16 April 2001, Rancho Minas Viejas, camino hacia las Pilas, Mpio. Villadlama, *E Estrada 12376* (CFNL); 17 March 1981, Carretera Monterrey-Lampazos, Cerro Colorado, Mpio. Lampazos, *O. Briones 536* (ANSM); n.d. March 1981, Montemorelos, *M. Almaguer s.n.* (ANSM, CIIDIR).

62.5. *Astragalus nuttallianus* DC. var. ***trichocarpus*** Torr. & A. Gray, Fl. N. Amer. 1: 333. 1838

Type:—USA, Texas*,* 1833, *T. Drummond s.n.* (holotype: NY00005570!; isotype: US00004252 digital image!, BM001042704 digital image!).

Astragalus trichocarpus Scheele, Flora 26 (No. 27): 442. 1843.

Leaflets elliptic to ovate, obtuse to acute, rarely some leaflets retuse; calyx teeth 1.5–3 mm long, the trichomes hispid to ciliate, up to 1.2 mm long; pod hirsute, the trichomes up to 1mm long.

Distribution:—Exclusive of north of Mexico, at several isolated localities; central Chihuahua (surrounding Chihuahua City, 28°39'N–106°05'W), northwest Durango (Tepehuanes and Luis Moya, 25°20'N–105°43'W) and southwest Coahuila (Estación Carneros, 25°07'N–10106'W). Also, in Texas (USA) (Fig. 19).

Habitat:—Clayey, sandy, gravelly and stony soils; desert scrub; acacia scrubland; grasslands; 200–1981 m.

Comments:—Sometimes forming dense colonies, giving the landscape a bluish color.

Specimens examined:—CHIHUAHUA: 4 April 1885, Hills and plains near Chihuahua*, C. G. Pringle 276* (NY, MEXU, US); 13 April 1891, Puente de St. Diego*, C. V. Hartman 595* (NY); 14 April 1886, Plains near Chihuahua, *C. G. Pringle 853* (NY); 1–21 May 1908, Vicinity of Chihuahua, *E. Palmer 171* (NY). **COAHUILA:** 23 October 1963, Carneros Pass, 23 miles s. of Saltillo, *H. D. Ripley, R. C. Barneby 13268* (NY); **DURANGO:** 10 November 1963, Luis Moya*, H. D. Ripley, R. C. Barneby 13508* (NY); 4–25 June 1906, Tepehuanes, *E. Palmer 259* (NY); 4 June 1906, Collected at Tepehuanes*, E. Palmer 259* (NY).

62.6. *Astragalus nuttallianus* DC. var. ***zapatanus*** Barneby, Field and Lab. 24: 36. 1956

Type:—USA, Texas, Webb. County, Laredo, 15 March 1917, *E. J. Palmer 11289* (holotype: NY00005571!).

Foliage dark-geen, the leaflets regardless of their shape, always all retuse or truncate and the ovary pubsecent.

Distribution:—Restricted in Mexico northern Tamaulipas, along the Bravo River (Fig. 60). Also, in Texas (USA) (Fig. 19).

Specimens examined:—TAMAULIPAS: 2 December 1939, Tamaulipas, *H. LeSueur* (TEX-LL); 17 March 1962, Tamaulipas, *M. Domínguez M., W. L. McCart* (TEX-LL). **TEXAS:** 15 March 1917, Webb County, Laredo, *E. J. Palmer 11289* (NY).

63. ***Astragalus orcuttianus*** S. Watson, Proc. Amer. Acad. Arts 20: 361. 1885

Type:—MEXICO, Baja California, Sierra Juárez, Cantillas Canon (Cañón del Tajo), 2 August 1883, *C. R. Orcutt 937* (holotype GH00059424 digital image!; isotype: UC (not found (at CCH1)).

Tium orcuttianum Rydb., N. Amer. Fl. 24(7): 397. 1929.—*Astragalus orcuttianus* S. Watson var. *gregorianus* M. E. Jones, Contrib. W. Bot. 10: 63. 1902.

Perennial. Stems up to 40 cm long, few to abundant from base, minute strigose, trichomes up yo 0.6 mm long, appressed, straight. **Stipules** 1–4 mm long, triangular slightly amplexicual or triangular and semi-amplexicual, embarcing almost half of the stem circumference, not connate. **Leaves** 3–18 cm long, leaflets 13–25, 2–15 mm long, obovate to suborbicular to truncate or retuse, frequently gradually decreasing in size towards the apex, the pairs separated by 2–3 times the width of each other, sometimes some leflets subopposite or completely alternate along rachis. **Peduncles** 2–13 cm long, ascendant, incurved; the racemes 3–10.5 cm long, flowers 6–12. **Flowers** rose-purple; the calyx 4.8–6 × 2.7–3.2 mm, strigose, trichomes white o white and black mixed, the tube 2.6–3.8 mm long, campanulate, the teeth 1.6–2.2 mm long, triangular to subulate, one pair usually shorter and wider than rest; the banner 9–12 × 6–9.3 mm, recurved, ovate to suborbicular, slight or strongly retuse; the wings 8.1–10.4 × 1.8–3.6 mm, the claw 2.7–3.7 mm long, the blade 5.8–8.2 mm long, obovate to oblong, incurved; the keel 7.7–8.6 × 2.5–3.1 mm, the claw 3–3.7 mm long, the blade 4.8–5.6 mm long, incurved, triangular. **Pod** stipitate (stipe 1–3 mm long), the body linear to narrowly-obovate, 1.2–2.3 × 0.3–0.35 cm, straight o incurved, ascendant, rarely sigmoid-shaped and ascendant, triquetrous, basally narrow, distally contracted in a narrow triangular beak, compressed laterally, ventrally carinate, dorsally wide and openly carinate, lateral faces slightly concave and obtuse, the valves finely fleshy, greenish, turning papery and ochre with age, lustrous, slightly reticulate, septum incomplete; seeds 1.8–2.3 mm long, mitten shape, brown to light-brown.

Distribution:—Endemic to Mexico, exclusively on the Peninsula of Baja California, isolated in a few localities. In Baja Calfornia, in Sierras Juárez and San Pedro Mártir, Valle de los Cirios (28°19'N–113°28'W) and Sierra Libertad (28°46'N–113°49'W). In Baja California Sur, on the western coast between Pabellón and Francisco Villa (25°48'N–112'01'W) (Fig. 20).

Habitat:—Slopes, mountainous areas; rocky soils; desert scrubland with cacti, mezquite and palms; 305–1100 m.

Comments:—Of the 28 species registered from this Peninsula, only four of them (*A. acutirostris, A. francisquitensis, A. nuttallianus* y *A. orcuttianus*) have triquetrous pods. *Astragalus francisquitensis* is isolated in the Sierra La Laguna (Baja California Sur), *A. nuttallianus*, with sessile pods. *Astragalus orcuttianus* and *A. acutirostris* converge in some low areas of the Sierra San Pedro Mártir, but, can be distinguished based on some particular characteristics, *A. acutirostris* is an annual with shorter racemes (1–4.5 cm long), few flowers (1–6) per raceme, smaller calyx (2.6–4.1 mm), smaller petals (banner, 4.7–7 mm, wings, 4.3–6.2 mm, the keel, 4.3–5.8 mm), shorter stipes (0.4–0.8 mm) and longer pods (up to 30 mm).

Specimens examined:—BAJA CALIFORNIA: 22 May 1996, Valle Las Flores; 11.9 millas al S de Bahía de Los Ángeles y 1.9 millas al SO de la carretera principal; lado este de Sierra la Libertad, *J. Rebman 3154, J. Dunn, M. Polak* (BCMEX, SD); 22 April 1951, Cañon de Cantillas, *C. F. Harbison s.n.* (CAS, SD); 30 March 1985, Cañon Carrizo, east side of Sierra de Juarez, the next major canyon N of C. de Guadalupe. Vicinity of major southward bend in the canyon, a couple of miles above its mouth, *T. Dallman 33, M. Guzy* (NY); 7 July 1889, Cantillas Canon, *C. R. Orcutt s.n.* (NY); 23–27 March 1957, Lower half of Canyon Diablito east face of San Pedro Martir Mountains, *V. Stombler 130* (CAS); 9 May 1941, Between La Huerta and El Cajon, Sierra San Pedro Martir, *I. L. Wiggins 9824* (CAS, US); 2 May 1889, Lower California, San Enrique, *T. S. Brandegee s.n.* (US); 19 March 1960, Sierra San Borja, desembocadura del cañón en El Terminal, *R. Moran 7938* (SD); 15 March 1995, Cañón el Cajón, al oeste del camino de tierra principal que proporciona acceso al Cañón de Guadalupe, *J. Rebman, A. Salywon, R. P. Martínez, G. Reinhardt, W. Hodgson 8743* (SD); 22 February1986, Boca del Cañon de Guadalupe, *E. Jonsson, D. Clemons 1305* (SD); 12 April 2002, Misión de Santa Maria, *M. Salazar 646* (SD); 22 April 2009, Sierra La Libertad: vecindad de Las Cuevas; en Arroyo La Soledad y las laderas bajas circundantes, *J. Rebman 17180, S. Bullock* (SD); 30 March 1991, Sierra La Asamblea, heading in from El Crucero off Hwy 1, 13.5 mi N of Jtn with main rd to Bahia de Los Angeles, in cyn SE side of Cerro La Gobernadora, *S. Boyd 5554* (MEXU).

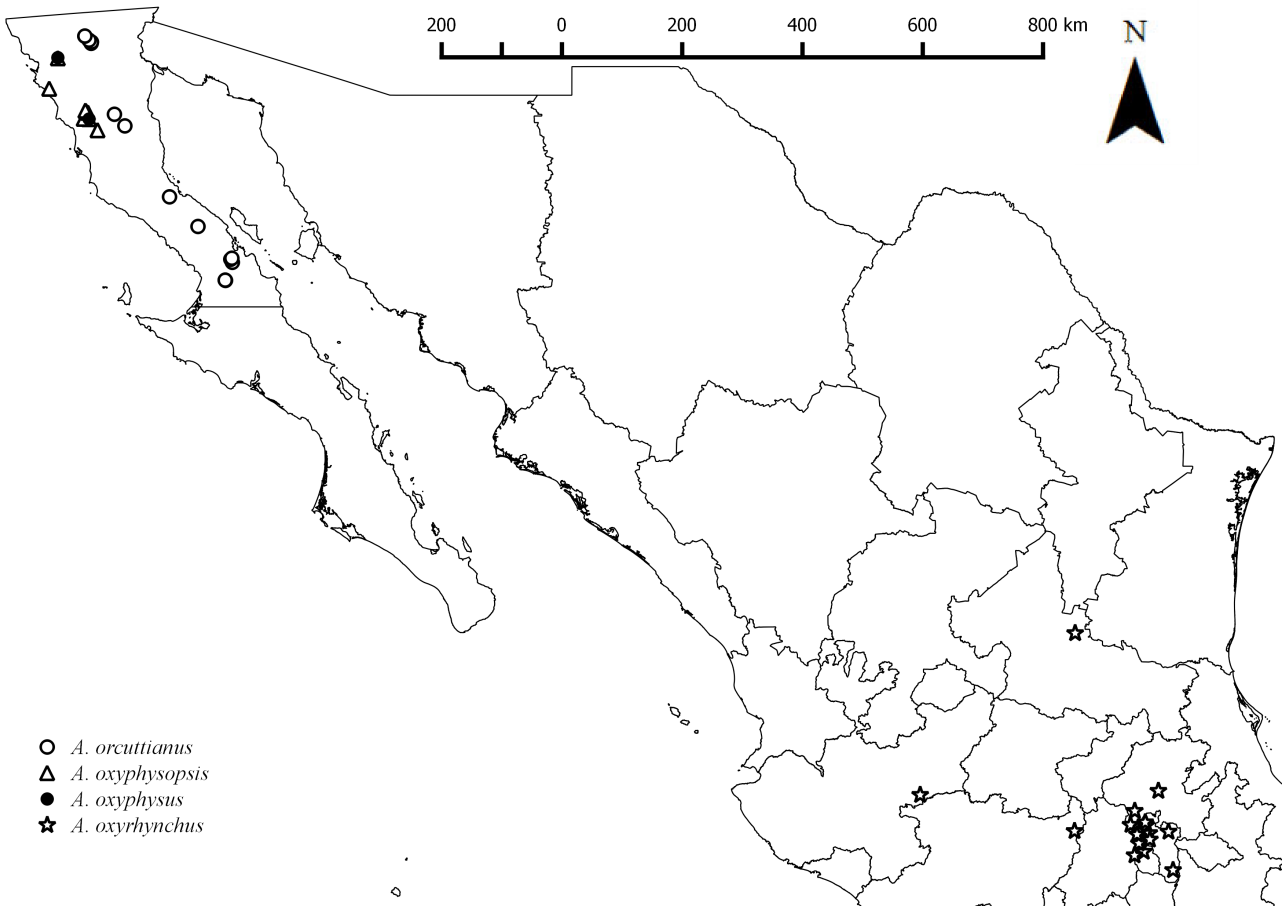

FIGURE 20. Map showing the distribution of *Astragalus orcuttianus, A. oxyphysopsis, A. oxyphysus,* and *A. oxyrhynchus* in Mexico.

64. *Astragalus oxyphysopsis* Barneby, Brittonia 28: 273. 1976

Type:—MEXICO, Baja California, locally common on ridge top, in clay soil of "dry bog," 2500 ft (• 750 m), between San Telmo and Rancho Meling, in W foothills of Sierra San Pedro Mártir near, *E. R. Blakley 7158*, 16 Mar 1973, (holotype: SD 87953!; isotype: NY00005819!).

Perennial. Stems villous, erect, suberect or somewhat decumbent, dense to softly pubescent, the trichomes up to 0.5 mm long, erect. **Stipules** 4–6.7 mm long, embracing only a third or less than stems circumference, semi-clasping, decurrent, not connate, triangular to wide-lanceolate. **Leaves** 5–11 cm long, leaflets 21–29, 4–15 mm long, oblong, elliptic to obovate, truncate to retuse apically, bicolored, adaxially clearer and less densely pubescent. **Peduncles** 10–19 cm long, erect, rarely sub-recurved; the racemes 5–13 cm long, flowers 30–45. **Flowers** whitish, immaculate, turning ochroleucous when drying; the calyx 6.6–7.6 × 3.8–4.4 mm, strigose, the tube 4.9–5.7 mm long; banner 13.3–14 × 7.2–8 mm, recurved, rhombic to oblanceolate; the wings 13–13.4 × 2.3–2.6 mm, the claw 5.6–6 mm long, the blade 5.3–5.5 mm long, oblanceolate; the keel 11.4–11.5 × 2.5–2.8 mm, the claw 5.5–6 mm long, the blade 5.2–5.5 mm long, incurved, semi-obovate. **Pod** 2–3.1 × 0.8–1.3 cm, deflexed, stipitate (stipe 7.5–16 mm long) oblique-elliptic or sometimes rhombic, inflated, bladder-like, but strongly compressed laterally (in the form of a traditional flying saucer), ventrally evidently carinate, the valves stiff-papery to somewhat leathery, semi-transluscent, pale green when young, turning ochre with age, smoothly reticulate, septum absent; ovules 14–15; seeds 3–3.7 mm long, green olive, opaque.

Distribution:—Endemic to Mexico, exclusively in Baja California, along road to San Pedro Mártir, westside of Sierra San Pedro Mártir and adjacent areas, San Telmo (31°04N–115°51'W), Potrero, Meiling Ranch, El Jonuco, San Rafael and Mina Santa Cruz to El Canuto (30°20'N–115°32'W) (Fig. 20).

Habitat:—Black soils; river banks; associated with chaparral; 475–750 m.

Comments:—Of all the species of *Astragalus* found in the Peninsula of Baja California, only two species, *A. oxyphyospsis* and *A. oxyphysus* have inflated bladder-like and laterally strongly flattened pods. Their populations

are separated by approximately 110 km, *A. oxyphysus*, recorded for Ojos Negros (31°55'N, 116°18'W), they can be differentiated by subtle characteristics of the pod, in *A. oxyphysopsis* the pod is continuous with its stipe (non-articulated) and glabrous, whereas in *A. oxyphysus* the pod is raised from the receptacle by an pubescent, articulate gynophore. *Astragalus oxyphysopsis* is sympatric in elevation at San Telmo (30°58'N–116°06'W) and morphologically similar to *A. trichopodus* var. *lonchus*, in growth habit, and leaf size, and stipitate pod, however, both can be differentiated based on their pod shape, *A. trichopodus* var. *lonchus*, has inflated bladder-like pods that are never strongly flattened.

Specimens examined:—BAJA CALIFORNIA: 16 March 1973, Ridge top, "dry bog" between San Telmo and Rancho Meling, Baja California. Alt. 2500 ft., *E. E. Blakley 7158* (NY); 3 May 1976, Mesa el Barrial, ca. 3 miles west of Rancho San José (Meling), *R. Moran 23093* (ENCB, MEXU, NY, SD, TEX-LL), *23095* (NY, SD, US); 3 May 1976, Mesa el Barrial, on ridge 4 miles west of Rancho San José, *R. Moran 23095* (NY); 1 June 1976, Sierra San Pedro Mártir. 4 km NW of Buena Vista, *R. Moran 23371* (NY, SD)*, 23377* (NY, SD)*, 23382* (NY, SD); Sierra San Pedro Mártir. 1 km NW of Santa Cruz Mine, 2 June 1963, Along arroyo near Rancho El Ciprés, *R. F. Thorne 31956* (MEXU, NY); 19 March 2012, Suroeste de Santo Tomás y oeste de la autopista 1; al norte de Erendira y al noreste de Punta Cabras: justo al lado de Rancho Embarcadero Road al oeste de Nativo del Valle, *J. Rebman 22693, S. Vanderplank, et al.* (SD).

65. *Astragalus oxyphysus* A. Gray, Proc. Amer. Acad. 6: 218. 1864

Type:—USA, California, Arroyo del Puerto, in the Mt. Diablo range, on dry hills, 11 June 1860–1862, Brewer 1259 (holotype: GH00058858 digital image!: isotype: US00004240 digital image!, CAS0027665 digital image!, P00585128 digital image!).

Tragacantha oxyphysa Kuntze, Revis. Gen. Pl. 2: 947. 1891.—*Phaca oxyphysa* A. Heller, Muhlenbergia 2: 86. 1905.

Perennial. **Stems** up to 80 cm long, ascendant or erect, striate, basally hollow, villous, the trichomes of two different lenghts, the short ones, up to 1 mm long, sinuous, incurved or somewhat ascendant, mixed with longer and straight ones up to 1.6 mm long. **Stipules** 3–12 mm long, the lower ones clasping, connate for almost half of its lenght, ending in a bidentate ochrea, the upper ones semi-clasping, surrounding almost a half of the stem circumference, triangular to lanceolate. **Leaves** 4.5–18 cm long; leaflets 11–31, 4–33 mm long, lanceolate, elliptic, oblong, oblong-elliptic to obovate, acute to obtuse, truncate to mucronate, rarely retuse, white-tomentose when young, sometimes adaxially glabrescent. **Peduncles** 4–17.5 cm long; the racemes 4.5–25 cm long, flowers 20–65. **Flowers** white or cream, immaculate; the calyx 8.5–10.3 x 2.8–3.9 mm, villous, trichomes white, white, tan or black, the tube 5.9–8.4 mm long, campanulate to cylindrical, oblique, the teeth 1.6–3.7 mm long, subulate to triangular, the dorsal one shorter or sometimes longer than the rest; the banner 13.44–19 × 4–8 mm, recurved, oblanceolate, rhombic to obovate, subtruncate or slightly retuse; the wings 15–18 × 2–3 mm, the claw 7.4–8.9 mm long, the blade 8–9.8 mm long, slightly incurved, oblanceolate; the keel 13–15 × 2–3 mm, the claw 7.6–9.3 mm long, the blade 5.9–6.5 mm long, lunate, almost elliptic. **Pod** elevated from receptacle by a gynophore (articulated in the base of the pod) 3–11 mm long, spreading or pendulous, 2–4.5 × 0.6–1.6 cm, almost elliptic, oblique, elliptic to rhombic, inflated, bladder-like, basally narrowed, distally ending in a triangular beak, laterally compressed, bicarinate, the valves thin, pale green, turning papery, ochre, sub-diaphanous, shiny with age, finely reticulate, septum absent; ovules 11–18; seeds 3–4 mm long, mitten shape, brown, sometimes with purple tones, smooth.

Distribution:—Rare in Mexico recorded in northern Baja California, only at one locality, Ojos Negros (31°55'N–116°18'W). Also, in Kern County, California (USA) (Fig. 20).

Habitat:—Low hills and plains; wayside; desert scrub; crop fields; 675 m.

Comments:—Along with *A. oxyphysopsis*, there are only two species of *Astragalus* that have inflated bladder-like in the central part but laterally strongly flattened pods, however, they can be discerned based on the continuity (stipe) or discontinuity (gynophore) of the structure that elevates the pod. In *A. oxyphysopsis*, the pod is continuous with the glabrous stipe (not articulated and thus the pod strongly attached to the receptacle), while in *A. oxyphysus*, the pod is sessile, but raised by a pubescent gynophore (articulated, from where it separates from the pod and therefore the pod weakly attached to the receptacle, soon caducous).

Specimens examined:—BAJA CALIFORNIA: 27 April 1980, 4 km NW of Ojos Negros and 1¼ km SSW of El Catorce, *R. Moran 28353* (ENCB, NY, TEX-LL).

66. ***Astragalus oxyrhynchus*** Hemsl., Biol. Cent.-Amer., Bot. 1: 265. 1880

Type:—MEXICO, South Mexico, Tizapan, valley of Mexico, 18 June 1865, *Bourgeau 329* (holotype:, *Bourgeau 329* K000478274 digital image!; isotype: US00004239 digital image!, P00585130 digital image!, P00585131 digital image!, P00585129 digital image!, P00585132 digital image!, S09-5206 digital image!).

*Tragacantha oxyrhy*ncha Kuntze, Revis. Gen. Pl. 2: 947. 1891.—*Hesperastragalus oxyrhynchus* Rydb., Bull. Torrey Bot. Club 53: 165. 1926.

Astragalus angelinus M. E. Jones, Rev. N.-Amer. *Astragalus* 286. 1923.

Perennial. Stems up to 26 cm long, decumbent or distally ascendant, strigose, the trichomes appressed, short, up to 0.4 mm long. **Stipules** 1.5–5 mm long, semi-clasping, triangular, ovate to lanceolate, papery. **Leaves** 2.5–10.5 cm long, leaflets 11–23, 2–16 mm long, linear, oblong to oblanceolate, sometimes separated from each other by spaces of 6–10 mm, distally obtuse to retuse, adaxially glabrate. **Peduncles** 3.5–10.5 cm long, curved or straight; the racemes 1.5–8 cm long, dense, flowers 15–37. **Flowers** pendulous, purple, or the banner purple veined; the calyx 3.2–4.6 × 1.9–2.4 mm, strigose, with black o black y white mixed trichomes, the tube 1.9–2.6 mm long, campanulate, the teeth 1–2.2 mm long, subulate, dorsal pair longer than ventral one or vice versa; the banner 5.1–6.4 × 4.2–5.5 mm, recurved, ovate or fan-shaped, deeply retuse; the wings 5–6.6 × 1.5–2 mm, the claw 2.2–2.6 mm long, the blade 3.4–4.5 mm long, oblong to obovate, incurved or straight; the keel 5–5.6 × 2–2.2 mm, the claw 2.3–2.7 mm long, the blade 2.7–3.5 mm long, incurved, obovate. **Pod** 5–9 × 2.8–5 mm, sessile, pendulous, trigonous to obscurely trigonous, widened, oblong, ovate to ovate to semi-ovate, straight o strongly curved, basally rounded or truncate, distally abruptly contracted in a triangular beak, rarely tenuously or, ventrally carinate, shallowly compressed, flattened, sometimes dorsally openly sulcate toward the base, laterally widely rounded, the valves slightly fleshy or hard papery, ochre or black with age, markedly reticulate, adpressed, with tiny trichoms 0.15–0.2 mm long, septum complete, the pod thnce bilocular; ovules 8–14; seeds 2–2.6 mm long, mitten shape, brown purple-black.

Distribution:—Endemic to Mexico, in southern Hidalgo (Sierra de Guadalupe, south of Tula, Tepeji del Río and El Salto) in close proximity to the State of Mexico, and in the northern part of the state of Mexico (between Atlacomulco and Jilotepec) (Fig. 20).

Habitat:—Calcareous soils, mountains with oak-pine forest, and coniferous forest, farmlands; 2073–2800 m.

Comments:—The northern area of the State of Mexico in close proximity to the southern region of Hidalgo harbors at least 11 *Astragalus* species. Three species (*A. oxyrhynchus, A. strigulosus* and *A. tolucanus*) are characterized by the presence of wide-ovate elliptic, oblong, ellipsoid, inflated but not bladder-like, not markedly and laterally flattened triquetrous or triquetrous-lanceolate pods. *Astragalus strigulosus* has white petals, elliptic or oblong-ellipsoid, 12–20 mm long, pedicellate pod, while *A. tolucanus* has pink-purple flowers and oblong-elliptic, 10–15 mm long, pedicellate pod. When individuals of *A. oxyrhynchus* are only in fruit they can be confused with *A. micranthus*, sympatric with it, both species have short pods, occasionally *A. oxyrhynchus* shows obscurely triquetrous pods, however, *A. micranthus* has short but always stipitate pods.

Specimens examined:—HIDALGO: 16 September 1903, El Salto, *J. N. Rose 7090, J. H. Painter* (NY): 20-VII/6 August 1896, Near Tula, *C. G. Pringle 6404* (ENCB, MEXU, NY, TEX-LL, US); 17 August 1902, El Salto, *C. G. Pringle 9722* (CAS, NY, US); 3/4 July 1905, Near Tula, *J. N. Rose 8353, J. H. Painter, J. S. Rose* (US); 5 June 1992, 500 m al O de Santiago de Anaya, *A. M. Soriano M. 167* (ENCB, MEXU). **JALISCO**: 7 July 1968, Puente de Ocotlán, *L. M. de Puga 1455* (IBUG). **MEXICO CITY:** VII-1937, Lomas D.F., *E. Lyonnet 1554* (MEXU, US). **MICHOACÁN:** 2 August 2001, Sierra Chincua, *M. G. Cornejo T. 263, G. Ibarra M.* (MEXU). **SAN LUIS POTOSÍ:** 5 August 1970, Centro Ovino Juan Sarabia, Mpiop. Santo Domingo, *A. Gómez* (ENCB). **STATE OF MEXICO:** 15 August 1951, C. Cuatepec, S. Guadalupe, Valle Mex., *E. Matuda 21222* (NY); 17 July 1986, Villa del Carbón, San Luis Loma Alta, *G. González M 1* (MEXU); 23 June 1968, 7 km al N de Zumapngo, *A. Arcos M. 71* (ENCB); 23 July 1974, Cerro de La Cruz, 5 km al NW de Tepotzotlán, *Rzedowski 31940* (ENCB); 12 June 1981, Cerro Gord, Mpio. Otumba, *M. Castilla 1256, D. Tejero* (ENCB); 26 June 1977, Cerro Ahumada, 6 km al N de Huehuetoca, *Rzedowski 35004* (ENCB); 7 August 1966, 7 km al N de Huehuetoca, *R. Cruz Cisneros 863* (ENCB); 27 August 1966, 5 km al S de Tequisquiac, cerca del Cerro Jalpan, *R. Cruz C. 1005* (ENCB); 7 July 1968, cerca de la Presa El Capulín, Fraccionamiento La Herradura, Mpio. Huixquilucan, *Rzedowski 25886* (ENCB); 24 June 1966, *R. Cruz C. 552* (ENCB); 24 August 1969, 1 km al SE de Coacalco, *E. Vilchis s.n.* (ENCB); 13 July 1967, Alrededores de la Presa La Concepción, Mpio, Tepozotlán, *L. Hilerio A. 250* (ENCB); 3 August 1976, Vertiente W del Cerro Sincoque, , Mpio. Huehuetoca, *Rzedowski 34341* (ENCB)|; 24 June 1966, Aprox. 5 km al W de Atizapán, de Zaraoza, *R. Cruz C. 777* (ENCB); 1 August 1990, Campo Experimental Chapingo, San Bartolo, Mpio. Texcoco, *A. Alcántar A. s.n.* (IEB); 23 June 1968, 2 km al W de San Miguel Tequixquiac, *Rzedowski 25837* (IEB).

67. *Astragalus palmeri* A. Gray, Proc. Amer. Acad. 7: 398. 1868

Type:—USA, Arizona, Camp Grant, in southern Arizona, 22 April 1867, *E. Palmer 52* (holotype: GH00058860 distial image!; isotype: MO-149234 distial image!).

Tragacantha palmeri Kuntze, Revis. Gen. Pl. 2: 947. 1891; *Phaca palmeri* (S. Watson) Rydb., N. Amer. Fl. 24: 354. 1929

Astragalus vaseyi S. Watson, Proc. Amer. Acad. Arts 17: 370. 1881–82.—*Phaca vaseyi* (Vasey) Rydb., N. Amer. Fl. 24(6): 354. 1929.

Astragalus metanus M. E. Jones, Proc. Calif. Acad. Sci. ser. 2, 5: 666. 1895.—*Phaca metana* (M. E. Jones) Rydb., N. Amer. Fl. 24(6): 354. 1929.—*Astragalus vaseyi* S. Watson var. *metanus* (M. E. Jones) Munz & McBurney, Bull. S. Calif. Acad. 31: 66. 1932.

Perennial. Stems up to 50 cm long, diffuse, sparsed and only with the distal parts ascendant, minute strigose, the trichomes up to 0.6 mm long, mainly appressed, sometimes with some few longer straight or sinuous ones, green or ashen color. **Stipules** 1.5–6.5 mm long, semi-clasping and decurrent, not connate. **Leaves** 3–16 cm long, leaflets 11–21, 2–26 mm long, oblong, elliptic to ovate or obovate, distally acute, obtuse and mucronate, rarely retuse, pubescent in both faces, adaxially denser, rarely, abaxially with the midvein prominent. **Peduncles** 4–14 cm long, ascending or curved; the racemes 3–21 cm long, flowers 10–40. **Flowers** purple to rose-shiny, the banner striate in the area where it folds, rarely apically whitish or with purple veins; the calyx 3.6–6.6 × 1.8–3.4 mm, minute strigose, the trichomes white, black or both, mixed, the tube 2.2–3.8 mm long, campanulate or somewhat ovoid, sometimes with purple tones, the teeth 0.9–2.8 mm long, subulate to triangular, the ventral pair the wider; the banner 7–10.4 × 5.2–8 mm, recurved; the wings 6.3–9.4 × 1.7–3.2 mm, the claw 2.8–3.8 mm long, the blade 4.5–6.2 mm long, oblong or oblanceolate to oblique obovate, strongly incurved; the keel 6.1–8.9 × 2–2.6 mm, the claw 2.5–3.7 mm long, the blade, 4.1–5.5 mm long, lunate, distally acute. **Pod** 0.9–2.3 x 0.4–1.7 cm, sessile, ascendant to pendulous, oblique, ovoid to elliptic and acuminate, moderate or markedly inflated, basally rounded or widely cuneate, distally contracted in a straight to incurved, a third or less of its length beak, lateral faces slightly compressed, sutures narrow, not strongly prominent, straight or little convex, dorsally pronounced, ventrally less pronounced, laterally inflated and rounded, the valves strigose, pale green or with purple tones, ochre, papery, opaque, septum absent; ovules 7–31; seeds 2–3 mm long, mitten shaped, orange, brown, somewhat rugose.

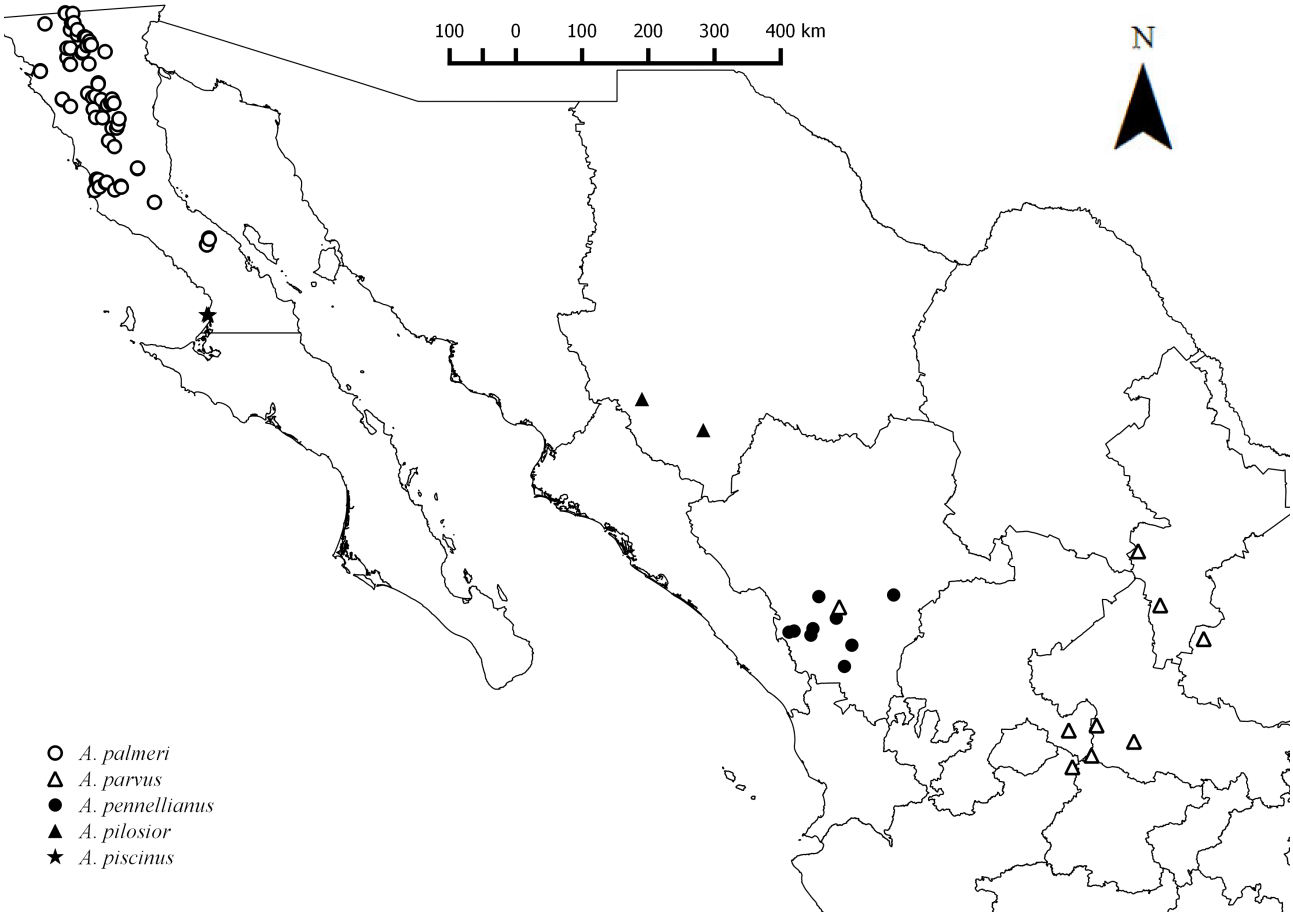

FIGURE 21. Map showing the distribution of *Astragalus palmeri, A. parvus, A. pennellianus, A. pilosior,* and *A. piscinus* in Mexico.

Distribution:—Endemic to the Peninsula of Baja California, distributed in the lower and higher elevation portions of the Sierras Juárez and San Pedro Mártir. Also, in Arizona and California (USA) (Fig. 21).

Habitat:—Sandy, gravel, granite soils; stony slopes; along streams; riparian areas; alluvial fans bordered by slopes with volcanic soil; pine-juniper forests; pine forest; high oak forests; chaparral; areas with chaparral-*Quercus*; also associated with mezquite, acacia, prickly-pear, columnar cacti,cirio; 60–1850 m.

Comments:—Two sierras, Juárez and San Pedro Mártir together harbor 18 species of *Astragalus*. By excluding those with red ochroleucous or completely white flowers, and 8 mm long or shorter, sessile and not inflated bladder-like pods, there are a group of four closely related species, *A. gruinus, A. hornii* var. *minutiflorus, A. proriferus* and *A. palmeri*

Of these, *A. hornii* is recognized by its oblong or compact, globose racemes, most commonly inhabiting cemented saline terraces, adjacent to coastal dunes. *Astragalus gruinus, A. proriferus,* and *A. palmeri* converge only in San Pedro Mártir, occurring together in oak-pine and pine forest at 1600–3000 m. *Astragalus grunius* has pods (9–28 mm long) strongly attached to the receptacle, when maturing and falling, they do together with the pedicels, while *A. proriferus* and *A. palmeri* have persistent pedicels and the pods are easily and soon caducous, this later species also occur at lower altitudes, 1650 m or below, associated with scrubs bordering the mountain range.

Specimens examined:—**BAJA CALIFORNIA:** 4 June 1998, California. 10 millas al E de Ojos Negros; 2.2 millas N de la autopista 3 y 0.8 millas de la carretera a Laguna Hanson, *J. Rebman 5323, S. Villarreal* (BCMEX, SD); 8 February1981, San Telmo, *M. Nuñez s.n.* (NY); 30 June 1962, Rancho Santa Isabel, Sierra Juarez, *R. Moran 9833* (ENCB, NY, SD); 8 May 1963, Sierra San Pedro Mártir. 2 miles E. of Rancho San Rafael, *R. Moran 10934* (NY, SD); 2 May 1973, Tinajas de Moraga, S. E. base of Cerro Matomí, *R. Moran 20701* (NY, SD); 3 May 1973, On NE slope of Cerro Matomí, *R. Moran 20783* (MEXU, NY); 2 June 1975, San Isidoro, *R. Moran 22306* (NY, SD); 1 May 1976, Sierra Juárez. Upper Cañada Taraizo. Seen to 1400 m., *R. Moran 22973* (NY, SD, TEX-LL); 6 May 1978, Sierra San Pedro Mártir. Cañon del Diablo. Seen at 750 m., *R. Moran 25635* (NY); 8 April 1979, Cañon San Matias, 8.0 km al este de San Matias, *R. Moran 26953* (CAS, ENCB, SD); 16 November 1980, Santa Lucia, mouth of Cañon San Carlos. Waifs far west of and below usual range, *R. Moran 29459* (ENCB, NY, SD); 9 March 1991, San Matias Pass, 29.5 miles west-northwest of Mexico Hwy. 5 on Hwy. 3, *T. R., R. K. Van Devender 91-143, T. L. Burgess, R. J. Rondeau, J. Wiens* (NY); 12 November 1983, 10 mi S of La Rumorosa, Sierra de Juarez, & ca. 3 mi S of Chi Chi de la India, *R. F. Thorne 57460, W. Wisura* (NY); 18–19 February1984, Granitic slopes of Canon de Guadalupe, *R. F. Thorne 57797, W. Wisura, A. Romsport* (NY); 12 May 1991, 1.8 miles north of km marker 110 of Rte. 3 on the road to Ejido Jamau, *J. Rebman 1118, K. Rice* (NY); 13 March 1992, Approximately 7 miles south of La Rumarosa which is on highway 2 between Tecate and Mexicali, *J. Rebman 1274, P. Cordoba* (NY, SD); 12 May 1984, Ca. 12.8 mi NE of Meling Ranch, *D. J. Pinkava, 14184, M. Mohlenbrock, L. A. McGill* (NY); 18 March 1936, Ca. 12.8 mi NE of Meling Ranch, *C. F. Harbison 14982* (CAS, NY); 21 February1933, Box Canyon, *C. Epling s.n., M. Darsie* (CAS, NY, US); 18 April 1985, Rancho La Choya: Chaparral, near Rancho, ca. 2.4 mi NE of Hwy 3 on alternate route to Laguna Hanson, *R. F. Thorne 60066, D. Charlton* (ENCB, MEXU, NY); 13 May 1941, Arroyo L'agua Marga, southern Sierra San Pedro Martir, *I. L. Wiggins 9947* (CAS); 29 April 1963, San Agustin, *H. S. Gentry 19969* (US); 27 March 1954, 1.8 miles e. of Alaska, road from Tijuana to Maexicali, *G. B. Ownbey 2072* (US); 13 March 1987, Cañon el Carrizo, *D. Clemons, E. Jonsson 1638* (SD); 15 April 2000, Área de Rancho Los Martires: a lo largo del área del río, *J. Rebman 6467, M. Simpson, A. Russell, D. Burton* (SD); 18 April 1984, Cañón de Guadalupe, lava sobre el cañón, *A. Romspert s.n.* (SD); 16 April 2013, Valle de Tranquilo, arroyo 1/2 km arriba Arroyo Rama 2, *J. Riley 100, B. Roldán* (SD); 16 April 2013, Reserva Natural de Valle Tranquilo: entre San Quintín y El Rosario; en Arroyo Rama, que es un afluente de Arroyo Hondo, aproximadamente a 5 millas al este de Mex. Carretera 1, *J. Rebman 25918, J. Riley, B. Roldán* (SD); 29 March 2013, Sierra Juárez Norte de Sierra Juárez. camino a 1 km al E del Rancho Club Hacienda. S20, *A. Medel Narváez 2013-040* (SD); 28 May 1983, Laguna Hanson, Parque Nacional Constitución, Sierra de Juárez, extremo norte del lago en el delta del pantano arenoso y márgenes húmedos del lago, *R. F. Thorne 55815, W. Wisura, W. Steinmetz et al.* (SD) 5 April 2005, Sierra La Asemblea: Carretera cerca de El Crucero, 1.0–1.5 millas (1.6–2.4 km) de Mx Highway 1., *S. J. DeGroot 4900* (SD); 27 April 2015, Vecindad de la montaña de gabro llamada Cerro El Tecolote: al sur de Mex. Autopista 3 en el Valle de la Trinidad; justo al sur del general Leondro Valle; a lo largo de un sendero en un área del cañón, *J. Rebman 30033, S. Vanderplank, W. Schmidtmann* (SD); 2 July 1978, 3.0 km al este de El Milagro, al noroeste de Valle Trinidad, *R. Moran 26171, J. Reveal* (SD); 20 April 1980, 4.0 km al norte de La Huerta, *R. Moran 28310* (SD); 18 September 1971, Sierra Juárez; en la cama de Arroyo los Chivos, 3.0 millas al norte de Rancho Casa Verde, *R. Moran 18502* (SD); 20 January 2015, Arroyo Rama; Reserva Natural Valle Tranquilo, *J. Riley 211, J. Campos, J. Simancas, E. Meyer, S. Still* (SD); 21 January 2015, Arroyo El Rosario; justo al este de Carretera, *J. Riley 214, N. Jensen, J. Campos, J. Simancas E. Meyer, S. Still* (SD); 2 March 2016, Arroyo Portrero afluente de Arroyo El Rosario,

J. Riley 411, S. Alfaro (SD); 10 April 1982, Los Alamitos, 6.0 km al noreste de San Vicente, *R. Moran 30321* (SD); 11 April 1983, Cañón la Calentura, 1.5 km west of Los Pinos, *R. Moran 30387* (SD); 29 May 1982, 4.0 km al este y noreste de Jacumé, *R. Moran* (SD); 30 May 1982, Sierra Juárez; Rancho San Francisco, 6.0 km al sur de La Rumorosa, *R. Moran 30820* (SD); 10 March 1987, Tajo Canyon, *D. Clemons, E. Jonnson 1625* (SD); 11 April 1964, En el arroyo que cruza al norte de La Huerta en el camino de Tecate a Santa Catarina, *E. Norland s.n.* (SD); 23 April 1951, Cañon de Cantillas, *C. F. Harbison s.n.* (SD); 18 March 1936, Cañón rocoso al noreste de Aguajita Spring, Valle de la Trinidad, *C. F. Harbison s.n.* (SD); 29 March 1936, *L. A. Huey s.n.* (SD); Paso San Matias, 26 March 1936, Paso San Matias, *L. A. Huey s.n.* (SD); 15 March 1936, Paso San Matias, *L. A. Huey s.n.* (SD); 27 March 1936, Paso San Matias, *L. A. Huey s.n.* (SD); 2 April 1953, Cañon Cantillas, *C. F. Harbison s.n.* (SD); 23 April 1951, Cañon de Cantillas, *C. F. Harbison s.n.* (SD); 30 May 1965, En el arroyo que cruza al norte de La Huerta en el camino de Tecate a Santa Catarina, *E. Norland s.n.* (SD); 22 February1986, Cañon de Guadalupe, *E. Jonsson, D. Clemons 1293* (SD); 12 August 1998, Sierra San Pedro Mártir: 1.1 millas al sureste de Mike's Sky Ranch a lo largo de Río San Rafael, *J. Rebman 5545, M. E. Resendiz* (SD); 23 April 2004, Sierra La Asamblea: al noreste de El Crucero (cruce de la autopista 1 y el camino a Bahía de Los Ángeles), al NO de Rancho San Luis; pico más alto del Cerro Los Pinitos, SO del campamento llamado "Mesquite", *J. Rebman 9978, M. Salazar, H. Riemann, B. Vinton* (SD); 16 June 1954, Cañón del Diablo, al norte y oeste de Picacho del Diablo, *K. L. Chambers 604* (SD), *608* (SD); 16 April 1984, 8.0 millas al este de Laguna Hansen, *A. Romspert s.n.* (SD); 17 April 1984, Laguna Hanson, *A. Romspert s.n.* (SD); 21 February1933, Lower California. Eastern Base of Sierra de Juarez, in El Canon de los osos, 4 mi. north of Gaskills tanks, *C. Epling, M. Darsie n.n* (MEXU); 17 June 1985, Laguna Hanson: Parque Nacional de Constitucion de 1957, Laguna Juárez and adjacesnt, *R. F. Thorne 60700, R. Dahlgren, S. Boyd, D. Charlton* (MEXU); 29 May 1961, At Santa Catarina, 64 miles southeast of Ensenadad, *R. E. Broder 507-A* (MEXU); 26 May 1987, Arne Strid, Kit Tan, F. Ehrendorfer and A. Liston, Baja California , Sierra de Juarez: Parque Nacional Constitución de 1857, Laguna Hanson & adj. rocky flats and slopes with large boulders & gravel of decomposed granite, *R. F. Thorne 62378, A. Srid, K. Tan, F. Ehredorfer, A. Liston* (MEXU); 10 April 1952, 2 to 3 miles north of San Fernando, *H. S. Gentry 11677* (MEXU); 23 April 1962, Ensenada, At north boundary of Paipai Reservation, along road to Rancho La Cienega, 3.5 miles north of Santa Catarina, 64 miles southwest of Ensenada, *R. E: Broder 782* (MEXU); 29 March 1975, Las Palomas, *A. Montufar L. 148* (ENCB); 5 February1981, Agua Viva, Carretera Ensenada-Ojos Negros, Mpio, Ensenada, *M. Mendoza L. 12* (ENCB).

68. ***Astragalus parvus*** Hemsl., Biol., Biol. Cent.-Amer., Bot. 1: 266. 1880

Type:—MEXICO, North Mexico, San Luis Potosí, 6000 to 8000 feet, *Parry & Palmer 174* (holotype: K000478271 digital image!; isotype: P00585136 digital image!, MO-128314 digital image!, NA0095604 digital image!, TEX-LL00371246!, NY00005826!, ISC-v-0000331 digital image!, US00001516 digital image!, PH00005499 digital image, BM000931685 digital image!, PH00005498 digital image!, GH00059427 digital image!).

Tragacantha parva (Hemsl.) Kuntze, Revis. Gen. Pl. 2: 947. 1891.—*Hamosa parva* (Hemsl.) Rydb., Bull. Torrey Bot. Club 54: 335. 1927.

Astragalus schaffneri M. E. Jones, Rev. N.-Amer. *Astragalus* 276. 1923.

Perennial. Stems up to 20 cm long, ascendant or spreading and diffuse, minute strigose, the trichomes up to 0.5 mm long. **Stipules** 1.5–4.7 mm long, lanceolate to triangular, free, not connate. **Leaves** 1.5–9 cm long, leaflets 7–19, 1.5–12 mm long, linear, oblong, oblanceolate to elliptic, obtuse to retuse, adaxially glabrate. **Peduncles** 2–7 cm long, suberect, deflexed with age; the racemes 0.4–2.4 cm long, flowers 3–14. **Flowers** purple to pale-purple; the calyx 4–5.1 × 1.3–2.2 mm, trichomes white, dense, the tube 2.3–3.1 mm long, campanulate to turbinate, white or occasionally pinkish; the banner 7.4–10 x 3.4–5.8 mm, recurved, obovate to rhombic; the wings 2.8–3.1 × 1.3–2 mm, the claw 2.6–3.2 mm long, the blade 4.7–6.6 mm long, linear, oblong to obovate, apically truncate or obtuse; the keel 5.4–6.2 × 1.4–2 mm, the claw 2.7–3.1 mm long, the blade 2.7–3.2 mm long, obovate. **Pod** 8–20 × 2–3.5 mm, ascendant, sessile or elevated from the receptacle by a tiny gynophore, triquetrous, linear to oblong, basally obtuse, distally contracted in a short, triangular beak, ventrally keeled, lateral faces flattened or somewhat rounded and convex with age, dorsally widely sulcate, the valves minute strigose, greenish or sometimes purple, papery, ochre, septum complete or incomplete; ovules 12–26; seeds 1.6–2.3 mm long, mitten shape, smooth, rarely rugose.

Distribution:—Endemic to Mexico, registered in northeastern Mexico in Nuevo Léon, adjacent to the geopolitical border of Coahuila, southwestern Tamulipas, south of San Luis Potosí, Zacatecas and a secluded location on the southern Puebla, almost on the geopolitical border with western Oaxaca (Fig. 21).

Habitat:—Calcareous and bare soils; pine forest; desert scrubs with creosote bush, mezquite and prickle pear; arid scrublands; disturbed areas with grasses and prickle pear; halophytic grasslands; oak forest; 1820–1880 m.

Comments:—In northeastern Mexico, *A. parvus* is distributed in areas where *A. coahuilae, A. emoryanus, A. nuttallianus* and *A. mario-sousae* are found, those species have purple or pink flowers, sessile triquetrous pods and, simple but not retrorse pubescence. Except for *A. parvus* with perennial habit and short (9 mm long or shorter pod), none of the species mentioned has this combination of characters.

Specimens examined:—DURANGO: 25-VII/5-VIII, 1906, Otinapa, *E. Palmer 394* (US). **JALISCO:** 22/24 June 2004, Nopalera silvestre Rancho La Luz, camino vecinal Vaquerias-Las Papas, *L. A. García R. 895* (IBUG). **NUEVO LEÓN:** 7 March 2003, Ejido San Joaquín, por la Carretera San Roberto-San Rafael, Mpio. Galeana, *E. Estrada 15278a* (CFNL); 5 July 2000, Ejido la Soledad, Mpio. Galeana, *E. Estrada 11431* (CFNL); 16 May 1985, San Gerardo, Mpio. Galeana, *G. B. Hinton 18831* (CIIDIR, ENCB, MEXU, TEX-LL); 25 April 1981, Santa Rita, *G. B. Hinton 18182* (ENCB, MEXU); 13 May 1992, San Juan Puente y Avilés, Mpio. Galeana, *Hinton 21944* (IEB). **PUEBLA:** VIII-1908, In the Vicinity of San Luis Tultitlanapa, Puebla, near Oaxaca, *C. A. Purpus 3208* (JEPS); 25 April 1981, Santa Rita, *Hinton et al., 18182* (ENCB, MEXU). **SAN LUIS POTOSÍ:** 20 August 1974, 46.0 mi. SE of the city of Zacatecas, 5.7 mi. SE of the Zacatecas state line along heavily grazed right of way of Highway 49, *R. Spellenberg 3799, J. Syvertsen* (NY, TEX-LL); 20 February1905, Chiefly in the region of SLP., *C. C. Parry 174* (NY). 5 July 1987, About 9 mi E of San Luis Potosi on Hwy 86 between San Luis Potosi and Cd. Valles; 2.9 mi W of jctn with rd to Valle de Zaragoza, *M. Luckow 2690* (NY, TEX-LL); 20 September 1961, Pastizal de Villa de Arriaga, *A. Gómez G. 276* (NY). **TAMAULIPAS:** 11 July 1949, 3 mi nof Miquihuana, in pine forest, *Stanford, Lauber, Taylor 2395* (JEPS). **ZACATECAS:** 3 August 1975, Km. 9, camino La Prudencia—Pinos, *N. Becerra s.n.* (MEXU).

69. *Astragalus pennellianus* Barneby, Mem. New York Bot. Gard. 13: 170. 1964

Type:—MEXICO, Durango, east slopes of Cerro Prieto, about 20 miles airline w of Otinapa, 10 July 1950, *J. H. Maysilles 7354* (holotype: MICH1107118 digital image!; isotype NU00005827!).

Perennial. **Stems** up to 40 cm long, decumbent to suberect, single or branched from base, strigose to villous, trichomes up to 0.9 mm long, sub-appressed to incumbent. **Stipules** 1–7.5 mm long, clasping and connate, papery, glabrate, forming a bidentate sheath around the stem´s circumference or those, single and acute apically (upper ones). **Leaves** 2–7.5 cm long, leaflets 15–47, 1–5.5 mm long, gradually decreasing the size of the base towards the apex, oblong, elliptic, ovate to obovate, wide notched, adaxially glabrate, abaxially densely pubescent along midvein. **Peduncles** 4.5–9 cm long, straight or pronouncedly curved; the racemes 2–4 cm long, flowers 7–25. **Flowers** purple, white to cream or pale-purple, deflexed with age; the calyx 4.7–6 × 2–2.7 mm, villous, the trichomes white short and long, others short ochre, the tube 3.9–3.8 mm long; the teeth 1.7–2.5 mm long, lanceolate to subulate; the banner 8–9.3 × 4–5 mm, recurved, elliptic to obovate, wide retuse; the wings 7.5–9.6 × 1.8–2.2 mm, the claw 3–3.8 mm long, the blade 5.5–6.6 mm long, elliptic to oblanceolate, oblique, incurved; the keel 6–7 × 2–2.3 mm, the claw 3–3.5 mm long, the blade 3.3–3.9 mm long, almost obovate. **Pod** deflexed, stipitate (stipe 3.5–7 mm long) obcompressed, lanceolate, oblong to elliptic, 16–28 × 5–6.2 mm, straight or slightly curved, basally narrow, distally ending in a short to long triangular to cuspidate beak, ventrally carinate, dorsally wide and openly sulcate, the valves glabrate, green, turning brown or sometimes purple with age, papery, slightly reticulate, septum complete, the pod thence bilocular or almost so; ovules 10–14; seeds 1.9–2.3 mm long, mitten shape, brown to purple.

Distribution:—Endemic to Mexico, exclusively from Durango, at central (Durango and Pánuco de Coronado), southwestern (Pueblo Nuevo) and southern end (Mezquital) Durango (Fig. 21).

Habitat:—Mountians; cold conifer forest; oak-pine forest; oak forest; grasslands associated with pine, juniper, oak, and madrone; associations of douglas fir-spruce-fir-oak, roadside; 2620–3100 m.

Comments:—The south region of Durango harbors eight species of *Astragalus*. Four of them has white flowers (with some shade of purple, pink or violet), purple to bluish; *A. goldmanii, A. hartwegii, A. pennellianus* and *A. potosinus*. The first two has triquetrous pods, although sometimes semi-ovate, but evidently triquetrous. *A. pennellianus* and *A. potosinus* are characterized by their oblong, elliptic, lanceolate (never triquetrous) stipitate pods, but, *A. potosinus* has ovary and pod pubescent.

Specimens examined:—DURANGO: 12 September 1982, 17 km al SE de El Salto, *S. González 2068* (IEB), *2068-a* (CIIDIR); 21 July 1985, 5 km de Charcos, camino a la Guajolota, Mezquital, Durango, *M. González 1800* (CIIDIR); 8 October 2010, *C. Vázquez R. s.n., N. B. Cabada A.* (CIIDIR); 27 June 1992, Pueblo Nuevo, Durango,

S. González 5270 (ANSM, CIIDIR, ENCB, MEXU); 15 July 1990, *A. García 4562, S. González* (ANSM, CIIDIR, MEXU); 21 July 1985, 6 km de los Charcos, camino a la Escondida, Mezquital, Durango, *M. González 1779, et al* (CIIDIR); 24 August 1957, Ca. 25 mi. W of Durango on road to El Salto, *O. T. Solbrig 4616, R. Ornduff* (NY); 24 August 1986, Just S of Puerto Buenas Aires along Mexican Hwy 40 between Mazatlan and Durango, *D. E. Breedlove 63019, B. Anderson* (NY); 29–30 August 1934, Metates, north of Cueva, *F. W. Pennell 18399* (NY, US); 13 August 1959, 17 miles southwest of El Salto, *U. T. Waterfall 15488* (MEXU, NY); 26 July 1972, Along Rte 40, 4.8 mi W of Los Mimbres, *L. McGill 9466, R. Brown, D. J. Pinkava* (NY); 18 October 1965, Near crest of Sierra Madre, 20 miles west of El Salto, *H. D. Ripley 14186, R. C. Barneby* (NY, US); 10 July 1950, E slopes of Cerro Prieto (about 20 airmiles W of Otinapa). Alt. 3000–3100, *J. H. Maysilles 7354, R. Brown, D. J. Pinkava* (NY); VI-1984, Pueblo Nuevo, Ej. San Pablo, *L. Martínez M. 529* (MEXU); 3 July 1982, 4.5 km, al SW de El Salto, Brecha El Salto-Pueblo Nuevo, *P. Tenorio L 800, C. Roero de T.* (MEXU); 26 June 1992, Pueblo Nuevo, Durango, *S. González 5270* (MEXU).

70. ***Astragalus pilosior*** R.W. Spellenb. & E.W. Anderson, J. Bot. Res. Inst. Texas 13(1): 131–140. 2019

Type:—MEXICO, Chihuahua, Mpio. de Batopilas, on old Batopilas-Urique road, near top of ridge between Río Batopilas and Río Urique, 16.8 km SSE of junction witroad down to Urique, 25 km road km NW of crossing of Río Batopilas at La Junta, 1.75 km N of junction to Manzano, 30 March 2013, *R. Spellenberg, W. Anderson 14532* (holotype: NMC not seen; isotype MEXU, NY(not found in those herbaria); paratype: Mexico, Chihuahua, Barranca Sinforosa, Rancho Coyeachic, 4 km E of Pino Gordo, 26°33'N 106°58'W, elev. approx. 2450 m, 8 March 1997, *Mark Fishbein 2910* ARIZ 336765, Mexico, Mpio. de Guachochi, on Samachique-Batopilas road (Chih. Hwy. 185) 7.2 km S of junction with Creel-Guachochi highway (Chih. Hwy. 25); 12 April 20, *R. Spellenberg & W. Anderson 14540* (MEXU, NMC, not found).

Perennial. Stems up to 55 cm long, branched or simple from the root, sometimes, the stems several cm below ground, sprawling to decumbent, white to ashy-pubscent, the trichomes 0.6–1 mm long. **Stipules** 4–5 mm long, of both types, the lowest ones clasping, shorter than the upper ones, white to light-green, the upper ones commonly free, foliaceous, lanceolate to acuminate, straight to reflexed, densely white-pubescent adaxially, abaxially with similar pubescence but less dense. **Leaves** 2–6 cm long, leaflets 9–19, 3–12 mm long, elliptic to obovate, rounded or shallowly notched apically, pilose abaxially, the trichomes, somewhat ascending and appressed, adaxial less densely so. **Peduncles** ascendant to incurved, 3–5 cm long; the racemes 10–35 mm long, 15–35 flowered. **Flowers** purple, blue with white tones, the banner with purple veins, ascending, declined soon, 5.5–6.7 mm long; the calyx 3.9–5.3 × 1.6–2.0 mm, scattered hairy, the tube 2.2–3 mm long, campanulate, the teeth 1.7–2.5 mm long; the banner 5–6.5 × 1.5–1.7 mm, wide oblong, rounded to truncate apically; the wings 5–7.1 × 1.3–1.4 mm, the claw 2.5–3 mm long, the blade 3.5–4.1 mm long, obliquely obovate, slightly incurved, apically rounded; the keel 5.3–5.8 x 1.7–1.8 mm, the claw 1.8–2.1 mm long, the blade 3.5–3.7 mm long, semi-ovate, wide acute apically; ovules 7–13. **Pods** crowded, pod stipitate, the stipe 0.4–0.8 mm long, hidden into the calyx, the body 9–12 mm × 2.6–3.2 mm, triquetrous, oblong to oblong-ovoid, incurved, basally cuneate, apically ending in a short, almost 2 mm long beak, ventral suture sharply angled, lateral faces convex, rounded, the dorsal suture deeply sulcate, septum complete, 3 mm deep, the valves green when young turning tan to brownish with age, with scattered hairy, the trichomes 0.5–0.7 mm long; seeds not seen.

Distribution:—Endemic to Mexico, recorded from few localities of the southwestern Chihuahua, Batopilas and Urique (Fig. 21).

Habitat:—Pine forest; 1900–2500 m.

Specimens examined:—CHIHUAHUA: 30 March 2013, Urique road, near top of ridge between Río Batopilas and Río Urique, 16.8 km SSE of junction with road down to Urique, 25 km road km NW of crossing of Río Batopilas at La Junta, 1.75 km N of junction to Manzano (18 air km SE of Urique, 9.4 km NNW of Batopilas), *R. Spellenberg, W. Anderson 14532* (CIIDIR); 8 March 2013, Barranca Sinforosa, Rancho Coyeachi, 4 km al E de Pino Gordo, *M. Fishbein 2910* (336765! Digital image, ARIZ).

71. ***Astragalus piscinus*** (M. E. Jones) Barneby, Shreve & Wiggins, Veg. Fl. Sonoran Des.1: 703. 1964

Type:—MEXICO, Baja California, Lagoon Head, 6–15 March 1889, *Plamer 776* (holotype: US00001503 digital image!: isotype: MEXU01169237!, GH00059428 digital image!).

Astragalus douglasii (Torr. & A. Gray) var. *piscinus* M. E. Jones, Contrib. West. Bot. 10: 61. 1902.—*Astragalus crotalariae* Torr. var. *piscinus* (M. E. Jones) Jeps., Fl. Calif. 2: 350. 1936.

Perennial. Stems up to 35 cm long, basally hollow, striate, minute strigose, trichomes up to 0.8 mm long, appressed, sub-appressed or straight. **Stipules** 3–5.3 mm long, lanceolate to ovate, semi-clasping, decurrent, not connate. **Leaves** 6–14.5 cm long, leaflets 15–25, 4–33 mm long, linear, wide-oblong, elliptic to narrow oblanceolate obtuse or/and mucronate, adaxially glabrate; **Peduncles** 11.2–15.5 cm long, striate; the racemes 2–5.5 cm long, flowers 6–22. **Flowers** ascendant, purple; the calyx 4.9–5.1 x 3 mm, strigose, the trichomes white o white and black mixed, the tube 3.5 mm long, campanulate, the teeth 1.5–1.6 mm long, subulate; the banner 1–1.3 × 0.6–0.7 cm, recurved, ovate to rhombic, basally narrow, apically retuse; the wings 9.2–11.6 × 2–2.4 mm, the claw 4–4.9 mm long, the blade 5.6–7.5 mm long, oblanceolate to oblong, oblique; the keel 8.4–9.2 × 2.3–2.6 mm, the claw 4–4.8 mm long, the blade 4.6–5.1 mm long, semi-elliptic, lunate. **Pod** 2–3 × 1–1.2 cm, ascendant o spreading, sessile (or with a minute gynophore soon and easily caducous), obliquely-elliptic, inflated, bladder-like, basally rounded to sub-conic, distally contracted in a triangular, straight to incurved triangular beak, 5–7.3 mm long, ventral suture slightly sulcate, dorsally strongly convex, the valves papery, minute strigose, ochre y transluscent, septum absent; ovules 18–25; seeds 1.5–1.9 mm long, mitten shaped, brown and opaque.

Distribution:—Endemic to Mexico, exclusively from Baja California, at the border with Baja California Sur (Fig. 21).

Habitat:—Desert plains; roads adjacent to the bay; gravel soils, 25–350 m, it occurs only on a very specific substrate on a small cerro near the ocean to the west of Jesus Maria. This is north of Guerrero Negro and in the extreme southern part of the state of Baja California. Common on sandy soils of this coastal cerro, but occured nowhere else. According to Rebman,.."I am pretty sure it is a micro-endemic species due to the specialize substrate at this locale (sic).

Comments:—The western coasts on the geopolitical boundaries of Baja California Sur, at the height of Turtle Bay and Guerrero Negro harbor three species of *Astragalus* with purple or white flowers but with lilac tones, inflated, sessile and bladder-like pods, *A. magdalenae* (2 varieties), *A. hornii* var. *minutiflorus* and *A. piscinus*. *Astragalus magdalenae* can be distinguished by its silvery and shiny leaden pubescence, the calyx teeth 1.8–2.7 mm long; the other two species has green to green-cinerose stems, calyx teeth shorter, 1.5–1.7 mm long and shorter keel, 3–4.8 mm long; *A. hornii* var. *minutiflorus* is distinguished of *A. piscinus* by its shorter (9–17 mm long) pod, holding 11–17 ovules.

Specimens examined:—BAJA CALIFORNIA: 21 April 2017, West of Villa Jesus Maria and Mex Hwy 1; near Laguna Manuela; on Morro de Santo Domingo; along the road to the lighthouse, *J. Rebman 33081, J. LaGrange, D. Applegate, F. Escoto R., M. Rodríguez E.* (SD); 21 April 2017, West of Villa Jesus Maria and Mex Hwy 1; near Laguna Manuela; on Morro de Santo Domingo; along the road to the north of the lighthouse, *J. Rebman 33087, J. LaGrange, D. Applegate, F. Escoto R., M. Rodríguez E.* (SD).

72. *Astragalus pomonensis* M. E. Jones, Contr. W. Bot. 10: 59, pl. 9. 1902

Type:—USA, California, Pomona, Tamcula, 24 April 1882, *Jones 3166* (holotype: RSA0003063 digital image!, RSA0003064 digital image!; lectotype: BM001042746 digital image!; isolectoype: NY00005662 digital image!, US01108150 digital image!).

Phaca pomonensis (M. E. Jones) Rydb., N. Amer. Fl. 24(6): 346. 1929.

Perennial; Stems up to 80 cm long, decumbent and scattered, suberect, rarely erect, pubescent to glabrate; trichomes up to 0.7 mm long, appressed, subappressed or almost straight. **Stipules** 2–10.5 mm long, ovate to deltoid, semi-clasping, surrounding half or almost the total of stem´s circumference, not connate. **Leaves** 5–22 cm long, leaflets 25–41, 3–37 mm long, linear, oblong, elliptic, ovate to rhombic, truncate, subacute, retuse, mucronate, abaxially minute strigose or few scattered trichomes. **Peduncles** 5.5–14 cm long, erect or somewhat decumbent with age; the racemes 3–9.5 cm long, flowers 10–45. **Flowers** whitish or white with green tones to ochroleucous; the calyx 5–7.7 × 3–4.5 mm, strigose, the trichomes white, black or both mixed, the tube 3.5–5 mm long, campanulate basally inequilaterous, the teeth 1–3 mm long, triangular to subulate; the banner 11–15.3 × 5.7–8 mm, recurved, obovate to rhombic; the wings 10.6–15 × 2.2–3.2 mm, the claw 5–6.9 mm long, the blade 6.2–9.5 mm long, oblong to; the keel 9.4–13.2 × 2.3–2.9 mm, the claw 5.1–6.9 mm long, the blade 4.6–6.9 mm long, incurved. **Pod** 1.8–5 × 1–2.4 cm, sessile, ascending o spreading, oblique, ovoid, inflated, bladder like, basally rounded, distally contracted in a short, straight or curved beak, ventrally open sulcate along the suture, dorsally slightly sulcate along suture, the valves ochre to purple, scattered strigose to glabrate with age, papery, sub-diaphanous and shiny, soflty reticulate, septum absent; ovules 34–55; seeds 2.3–3.5 mm long, mitten shape, brown, olive, opaque.

Distribution:—In Mexico, only in Baja California, from Ensenada, through Ejido Erendira and San Vicente to Ignacio López Rayón (31°11'N–116°20'W) and one isolated location, near Santa Catarina (29°31'N–115°15'W). Also, in California in USA (Fig. 22).

Habitat:—Sandy and granitic soils; grasslands; stream banks with willow, salt cedar; roadside; disturbed areas with estafiate; 225–675 m.

Comments:—This small surface adjacent to Ensenada harbors at least nine *Astragalus* species. But only *A. douglasii* var. *parishii* and *A. pomonensis* has whitish, yellowish to ochroleucous flowers, they can be discerned by the leaflets number (11–19 in *A. douglasii)* and petal size (shorter in *A. douglasii*, banner 8.1–12 mm, wings 7.9–10.7 mm, keel 7.8–9.6 mm).

Specimens examined:—BAJA CALIFORNIA: 20 May 1979, Las Cruces ca. 20 km east of Ensenada, *R. Moran 27300* (CAS, SD); 18 March 1956, *J. T. Howell San Carlos Canyon below Agua Caliente, 31085* (CAS); 4 April 1982, Canon San Jose, 17 km E of San Vicente, in brad sandy arroyo, *R. Moran 30266* (MEXU, NY, SD, TEX-LL); 25 April 1976, Common at roadside and on grassy flat, about 3 kilometers south of Uruapan, *R. Moran 22905* (ENCB, NY, US); 1 May 1976, Mountains 8 km SW of Ojos Negros; noted for ca. 3 miles only at roadside, *R. Moran 22919* (ENCB, NY, SD); 5 April 1931, Las Animas Canyon 15–20 miles osuth of Ensenada, *I. L. Wiggins 5169* (CAS, NY, US); 30 May 1983, Ca. 16.6 miles east of Ensenada along Hwy to San Felipe, in sandy burned-over field (probably formerly mostly sage scrub) *R. F. Thorne 56016,W. Wisura, W. Steinman, et al.* (SD); 16 November 1980, Santa Lucía, mouth of Cañón San Carlos, in sandy bottom near stream, *R. Moran 29458* (SD); 4 April 1982, Rancho San José, 16 km east of San Vicente, in weedy field & at roadside, *R. Moran 30255* (ENCB, SD); 10 April 1982, Arroyo San Vicente in sandy bed, 3 km NE of San Vicente, *R. Moran 30275* (MEXU, SD); 10 April 1982, Cañón Agua Caliente, 5 km NE of San Vicente, in sandy bottom,*R. Moran 30303* (SD); 18 February1956, Floor of San Carlos Canyon below Aqua Caliente, *J. T. Howell 31085* (SD); 8 April 1979, 1 km ENE of Media Luna (west of Ojos Negros), at roadside, *R. Moran 26972* (SD); 21 March 2012, Canyon San Isidro; approximately 3.3 km northeast of Erendira, in the bottom of the canyon just south off the main road into Erendira, *J. Rebman 22838, S. Vanderplank* (SD); 18 March 1987, *L. E. López 38* (MEXU); 14 July 2016, Ejido Eréndira, aporx. 100 km al sur de Ensenada, por la carretera a San Quintín, mpio. Ensenada, *Estrada 22829*, *Yen, Delgadillo* (CFNL).

73. ***Astragalus pomphocalyx*** Villarreal & M. A. Carranza, Brittonia 46(4): 337. 1994

Type:—MEXICO, Coahuila, Mpio. Ramos Arizpe, Hwy 40, 30 miles W of Monterrey, 21 March 1964, *T. Bruny & R. Pena 31* (holotype: TEX00371250!).

Perennial. Stems up to 40 cm long, erect or ascending, densely villous, whitish, trichomes up to 0.9 mm long. **Stipules** 3–6 mm long, free, triangular to ovate, the lowest ones auriculate, not connate. **Leaves** 8–10 cm long, leaflets 15–19, 9–12 mm long, elliptic to ovate, retuse, densely villous, the trichomes adpressed, abaxially denser. **Peduncles** 3–5 cm long, straight or curved; the racemes 2–5 cm long, dense, subcapitate, flowers 10–30. **Flowers** blue; the calyx 9–10 × 3–5 mm, urceolate to globose, densely villous, trichomes white only, the tube 4–5 mm long, the teeth 4–5 mm long, subulate; the banner 16 × 8 mm, elliptic, retuse; the wings 13 × 3 mm, the claw 5 mm long, the blade 5 mm long, oblique, oblong to oblanceolate, slightly incurved; the keel 11 × 3.2 mm, the claw 5 mm long, the blade 6 mm long, somewhat obovate. **Pod** 6–8 × 4–6 mm, sessile, sub-oblong, widened, stiff, inflated but no bladder-like, laterally somewhat compressed, basally rounded, distally contracted abruptly in a triangular conic beak, with the persistent style for a time, ventrally sulcate along straight suture, dorsally widely and openly sulcate, the valves rigid, scattered strigose; septum complete, the pod two-celled; ovules 4; seeds mitten shape, smooth.

Distribution:—Endemic to Mexico, northeast Mexico, semi-arid regions in the geopolitical zone southwest of Coahuila (Estación Vega, 25°26'N, 101°06'W) and central-east (Mina, 25°40'2"N, 100°45'06 "W) of Nuevo León (Fig. 22).

Habitat:—Stony soils; maguey scrubland, acacia scrublands; 1800 m.

Comments:—In the distribution area of *A. pomphocalyx*, seven other *Astragalus* species are distributed, but, only three of them (*A. mollissimus*, *A. pomphocalyx* and *A. rupertii*) have simple pubescence, blue, purple or violet flowers (never red or yellow) and inflated (but no of papery consistence) and widened pods; *A. mollissimus* is distinguished from the other two ones by its larger petals (banner 15.3–25 mm, wings 14.5–20 mm, the keel 11–13.6 mm). *Astragalus pomphocalyx* and *A. rupertii* has several features that distinguish them from each other, however, the latter has longer peduncles, regularly surpassing leaves (rarely as long as these), its racemes are more lax (up to

10 cm long, non-compact), and the oblong-urceolate calyx (non-globose-urecolate) and densely strigose, with black trichomes (sometimes some white trichomes present).

Specimens examined:—COAHUILA: 5 June 1992, Estación de Microondas Vega, 8 km. W de Saltillo, Carretera 40, *J. A. Villarreal 6644, M. A. Carranza, D. E. Lozano, S. Comparán* (ANSM, MEXU, NY). **NUEVO LEÓN:** 21 March 1964, Highway 40, 31 mi W of Monterrey, *A. Bruni 31, R. Pena* (NY).

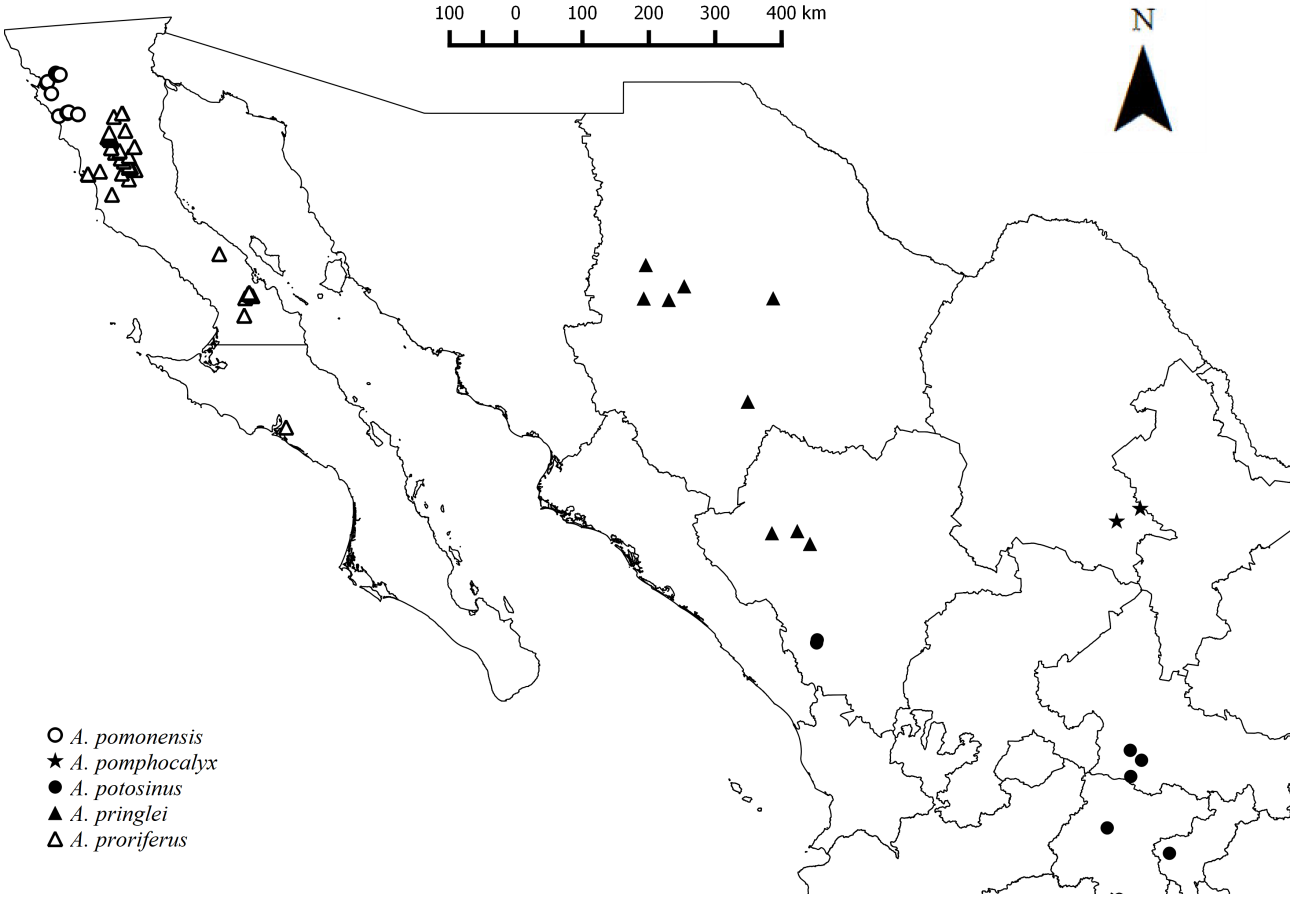

FIGURE 22. Map showing the distribution of *Astragalus pomonensis, A. pomphocalyx, A. potosinus, A. pringlei,* and *A. prorifer* in Mexico.

74. *Astragalus potosinus* Barneby, Mem. New York Bot. Gard. 13: 166. 1964

Type:—MEXICO, San Luis Potosí, sine loc, 1878, *C. C. Parry & Ed. Palmer 775* (holotype: NY00005832!; isotype: P00585141 digital image!, ISC-v-0000334 digital image!, NA0095603 digital image!, NA0095602 digital image!).

Perennial. Stems up to 50 cm long, ascendant, pilose, trichomes up to 0.7 mm long, straight or sinuos, sub-appressed. **Stipules** 1.5–6 mm long, clasping and connate (the lowest ones), constituting an apical bidentate sheath, the upper ones simple, lanceolate to triangular, constituting a sheath half of its length. **Leaves** 1.5–6 cm long, leaflets 11–23, 2–16 mm long, oblong, elliptic to obovate, truncate or retuse, adaxially glabrate, scattered and appressed pubescent to densely pubescent, especially when young. **Peduncles** 3–15 cm long, straight or slightly curved; the racemes 1–7.5 cm long, flowers 8–20. **Flowers** purple, turning bluish or ochroleucous when drying; the calyx 4–6.1 × 2.2–2.7 mm, pilose, trichomes white or black, sometimes both mixed, the tube 2.3–3.4 mm long, campanulate, the teeth 1.5–3 mm long, subulate; the banner 7.4–8.4 × 3.9–4.6 mm, ovate to oblanceolate, briefly retuse; the wings 7–8.3 × 1.5–2.3 mm, the claw 2.7–3.2 mm long, the blade 5.1–6.1 mm long, oblong to oblanceolate, oblique; the keel 5.8–6.3 × 1.9–2.1 mm, the claw 2.8–3 mm long, the blade 3–4 mm long, oblique-obovate. **Pod** 14–25 × 4–6 mm, deflexed, stipitate (stipe 2–5 mm long), linear, oblong to elliptic, dorsoventrally compressed, ventrally carinate, dorsally open and slightly sulcate, the valves thin, turning papery with age, ochre or even black with age, minute strigose, trichomes white or black, or both mixed, reticulate; septum incomplete; ovules 10–15; seeds 1.7–2 mm long, mitten shaped, brown, smooth.

Distribution:—Endemic to Mexico, central part of Mexico, south San Luis Potosí (around San Luis Potosí City), central and west of Guanajuato, isolated in southwest Durango (El Salto) (Fig. 22).

Habitat:—Cold humid plains; north slopes; stony soils; pine-oak forest; oak-manzanita forest; conifer forest; 1829–2591 m.

Comments:—In Durango, *A. potosinus* share similar habitat with *A. hartweggi*, both species have purple flowers, but *A. hartwegii* has triquetrous and sessile pod. *Astragalus pennellianus* (endemic from Durango) is very similar carpologically and sympatric to *A. potosinus*, but the first one, regularly has white petals (very rarely with purple-light tones), but averaging 25–41 leaflets, and with both, the ovary and the pod pubescent. Further south of the distribution of this species, in San Luis Potosi, Querétaro, and Guanajuato, *A. potosinus* is associated with at least eight species of *Astragalus*, but only two of them (*A. strigulosus* y *A. tioides*) possess oblong, elliptic, ellipsoid or somewhat widened stipitate pods, never triquetrous or inflated like a bladder. *Astragalus strigulosus* can easily distinguished of those two by its white petals, and *A. tioides* is discernible by its few flowered (2–5) racemes, larger petals (banner 11 mm, wings 8.9–9.1 mm, and keel 7.1 mm), slightly larger (20–35 mm) pod, and shorter stipe (1–2 mm long).

Specimens examined:—DURANGO: 13 August 1959, 6 miles south-west of El Salto,*U. T. Waterfall 15476a* (NY); 5 October 1965, 3½ miles west of El Salto, *H. D. D. Ripley 13974* (NY). **GUANAJUATO:** 29 October 1969, Mts. n-e. of Guanajuato, *H. D. Ripley 13366, R. C. Barneby* (NY); 27 April 1949, 5 millas al O de Cerro Zamorano, *R. McVaugh 10399* (MEXU). **QUERÉTARO:** 24 November 1989, *E. González P. 1280* (MEXU). **SAN LUIS POTOSÍ:** 1879, Ex convalli San Luis Potosí, *J. G. Schafner 615/821* (MEXU, NY), *822a* (MEXU); 1878, Chiefly in the region of San Luís Potosí. Alt. 6000–8000 ft, *C. C. Parry 175, E. Palmer* (NY); 6 February1963, Rancho El Milagro, Km 37 carretera San Luis Potosí-Río Verde, Mpio. Zaragoza, *A. Gómez 842* (ENCB, MEXU); 6 October 1971, Las Ciénegas, en lo alto de la Sierra San Miguelito, Mpio. Villa de Reyes, *M. F. Robert 1187* (ENCB).

75. ***Astragalus pringlei*** S. Watson, Proc. Amer. Acad. Arts 21: 449. 1886

Type:—MEXICO, Chihuahua, Plains near Chihuahua, 8 April 1885, *Pringle 79* (holotype:H00059429 digital image!; isotype: E00383736 digital image!, US00001519 digital image!, UVMVT024923 digital image!, CAS0000806 digital image!, K000478269 digital image!, NY01268303!, F0058944F digital image!, MICH1107119 digital image!, P00585143, BM000931687 digital image!, GOET004820 digital image!).

Hamosa pringlei (S. Watson) Rydb., Bull. Torrey Bot. Club 54: 336. 1927.

Astragalus mexiae M. E. Jones, Contr. W. Bot. 18: 44. 1933.

Perennial. Stems several to many, up to 24 cm long, branched from base or a little higher, strigose, trichomes up to 0.5 mm long, straight, appressed. **Stipules** 1.5–3 mm long, semi-clasping, not connate, ovate to triangular. **Leaves** 1–4.5 cm long, leaflets 7–15, 1.5–6.2 mm long, elliptic to oblanceolate, obtuse, retuse to truncate, bicolored, adaxially darker and glabrate or glabrate adjacent to midvein, abaxially pubescent. **Peduncles** 0.5–5.5 cm long, erect or curved, decumbent with age; the racemes 0.5–4.5 cm long, flowers 3–12. **Flowers** pale purple, purple or also with lilac tones; the calyx 5.6–8.6 × 2.4–2.9 mm, strigose, trichomes white, the tube 4.1–5.7 mm long, campanulate to subcylindrical, somewhat basally inequilateral or gibbose, the teeth 1.5–2.8 mm long, subulate; the banner 12.1–16 × 3.4–4.3 mm, recurved, oblong to lanceolate, somewhat retuse; the wings 11.5–13.8 × 1.7–2.5 mm, the claw 4.7–5.6 mm long, the blade 7.2–8.7 mm long, linear to oblanceolate, straight or sometimes distally incurved; the keel 8.6–9.8 × 2–2.3 mm, the claw 4.7–5.8 mm long, the blade 4–4.6 mm long, elliptic or almost so, oblique. **Pod** 7–11.3 × 2.1–3.5 mm, sessile, humistrate with age, triquetrous, oblong, lanceolate, straight to somewhat curved, basally rounded, distally abruptly contracted in a short, triangular beak, ventrally carinate, laterally slightly convex, dorsally open and deeply sulcate, the valves green or with purple tones, strigose, finely reticulate, septum complete, the pod thence bilocular or almost so; ovules 11–15; seeds 1.9–2.3 mm long, mitten shaped, brown, sometimes with purple tones, shiny.

Distribution:—Endemic to Mexico. Northwest Mexico, local in Sonora (Yécora), in Chihuahua from northwest (Casas Grandes, through Galeana, Buenaventura, Madera, Namiquipa, Aldama, Gómez Farías, Chihuahua, Cuauhtémoc and La Junta), to the south to Balleza, local in Durango (Santiago Papasquiaro) (Fig. 22).

Habitat:—High mountainous peaks and high palins and hills; stony, volcanic, white, light, alluvial, clayey, and compacted soil; grasslands; overgrazed areas; microphyllous scrubland; pine-oak forest; oak-juniper forest; oak fotrest with maguey and blue grama; mixed forests with oak, juniper, pine; oak-grassland; 1450–2286 m.

Comments:—The semi-arid and high mountain ranges regions in Chihuahua and Durango, comprising the *A. pringlei* distribution is assembled with the presence of other sixteen *Astragalus* species, but *A. pringlei* and three other species (*A. nuttallianus*, *A. quinqueflorus*, and *A. hypoxylus*) are characterized by purple, pink, lilac or white (with

purple tones) petals and triquetrous sessile pods. For these only *A. pringlei* have relatively large leaflets (averaging 8–25 mm long). From de other species, none of them have the calyx greater than 7 mm or the banner larger than 11.2 mm long, and the wings larger than 11 mm. The pods of *A. nuttallianus*, *A. pringlei* and *A. quinqueflorus* are relatively similar in shape, consistency and size, but easily discernible with the flower size.

Specimens examined:—CHIHUAHUA: 8 April 1908/27 April 1908, Vicinity of Chihuahua, *E. Palmer 89* (NY, US); 1885, Near Chihuahua, *T. C. Porter s.n.* (NY); 27 May 1929, Rancho Colorado, *Y. Mexia 2563* (JEPS); 3 May 1959, Vicinity of Rancho Ojito, *D. S. Correll 21473, I. M. Johnston* (JEPS); 5 May 1959, in lower parte of Canyon along abandoned railroad, north of San Francisco del oro, *D. S. Correll 21512, I. M. Johnston* (ENCB, JEPS); 18 August 1998, 2 km S of Santo Tomas in the Barrio San Ignacio, ca. ½ km S of Rio Papigochic, *R. Spellenberg 12693, L. Brouillet, T. K. Todsen* (NY); 13 April 1984, Ca. 32 km SW of Matachic on road to Tesanachic, *R. Spellenberg 7678, R. Soreng* (MEXU, NY); 13 May 1994, Alrededores de Chihuahua, *E. Estrada 2484* (NY); 8 April 1885, Plains near Chihuahua, *C. G. Pringle 79* (MEXU, NY); 26 October 1972, 6.0 mi W of Dolores Hidalgo just west of Los Hernandez, *R. W. Spellenberg 2972* (NY); 20 March 1984, *Sierra Madre Occidental, 10½ miles southwest of the highway at San Jose de Babicora on a dirt road over the mountains to Highway 16 and Madera, A. C. Sanders 4734, West, Charlton, McIntosh, Vanway, Gilbeaut, Gould* (NY); 24 March 1984, 16.1 miles northwest of Balleza on the dirt road toward Rocheachi (60 miles) and Creel, *A. C. Sanders 4784, West, Charlton, McIntosh, Vanway, Gilbeaut, & Gould* (NY); 1/8 April 1908, Vicinity of Miñaca, Chihuahua, *J. N. Rose 11641* (US). **DURANGO:** 25 March 1906/16 April 1906, Collected at Tepehuanes, *E. Palmer 18* (NY, US) & 26 (JEPS); 5 May 1959, Vicinity of Rancho Ojito, *D. S. Correl 21475, I. M. Johnston* (NY); 19 March 1983, 3–5 km al Oeste de La Soledad, 11 km NW Santiago Papasquiaro, *R. C. Díaz 112* (NY); 19 March 1983, 3–5 km al Oeste de La Soledad, 11 km NW Santiago Papasquiaro, *R. Corral D. 112* (MEXU).

76. *Astragalus proriferus* M. E. Jones, Zoë 4(3): 275. 1893

Type:—MEXICO, Baja California, San. Pedro Mártir, 5 May 1893, *Jones s.n.* (holotype: UC (not found at CCH1); isotype POM (not found at CCH1): *T.S. Brandegee s.n. 16 April 1893* NY0005834!).

Phaca proriferus (M. E. Jones) Rydb., N. Amer. Fl. 24(6): 355. 1929.

Astragalus julianus M. E. Jones, Proc. Calif. Acad. Sci. ser. 2, 5: 667. 1895.

Annual or perennial, if perennial, of short duration. **Stems** up to 50 cm long, diffuse, incurved or sub-ascending, villous, trichomes up to 0.9 mm long, ascendant or incurved. **Stipules** 2–6 mm long, clasping, decurrent, not connate, triangular. **Leaves** 3–11 cm long, leaflets 13–21, 5–21 mm long, lanceolate, oblong to elliptic, obtuse, mucronate, retuse or subacute, pubescent in both faces or sub-glabrous adaxially. **Peduncles** 2.5–9 cm long; the racemes 3–10.3 cm long, flowers 10–32. **Flowers** pink-purple; the calyx 4–5.2 × 2–3 mm, densely villous, trichomes white o white and black mixed, the tube 2.3–3.3 mm long, the teeth 1.5–2.3 mm long, subulate to triangular; the banner 7.4–9.1 × 4.4–7.7 mm, recurved, oblanceolate, slighty notched; the wings 6.4–8 × 1.8–2.7 mm, the claw 2.3–2.8 mm long, the blade 4.5–5.7 mm long, oblanceolate to obovate, incurved; the keel 6–7.6 × 2–2.3 mm, the claw 2.7–3.4 mm long, the blade 3.4–4.8 mm long, lunate, incurved, elliptic. **Pod** ascendant, deflexed or spreading, subsessile or elevated in a obsolete gynophore 0.4–0.7 mm long, oblique, elliptic to ovoid, 0.9–2.3 × 0.4–1.2 cm, inflated, widened, like a bladder, basally rounded to somewhat cuneate, distally contracted in a short 2–4 mm long, triangular straight to bend, laterally compressed beak, ventrally carinate, straight o slightly convex, dorsally strong or gibbously convex, the valves thin, but hard, papery, ochre, scatter or densely strigose, trichomes up to 0.8 mm long, ascendant, sinuous, extended or sub-appressed; septum absent; ovules 7–16; seeds 1.9–2.8 mm long, mitten shape, brown, purple to brown-orange, smooth, mainly opaque.

Distribution:—Endemic to Mexico, exclusively of the peninsula of Baja California, in Baja California at Sierras Juárez and San Pedro Mártir, and areas of mountain ranges and plains bordering them. Further south, in Sierra San Borja (28°45'N–113°36'W) and Sierra San Luis (28°55'N–114°09'W); in Baja California Sur, in two localities, Sierra de San Francisco (27°38'N–113°06'W) and adjacent to Cerro El Azufre (27°30'N–112°36'W) (Fig. 22).

Habitat:—Stony slopes; granitic and gravel soils; sandy streams; sandy desert areas; bordering streams; associated Juniper; grassland-oak associations; pine forest; transitions of pine-juniper; chaparral-forest; 600–2100 m.

Specimens examined:—BAJA CALIFORNIA: 16 April 1893, San Pedro Martír, *T. S. Brandegee s.n.* (NY); 30 April 1987, Rancho La Concepción 33 km SW de el Observatorio, San Pedro Martir, *P. Tenorio L. 13182, C. Romero de T.* (CAS, MEXU); 20 June 1988, Near La Corona de Abajo, 0.75 miles up main road from entrance gate, Sierra de San

Pedro Martir, *S. Boyd 2793, T. Ross* (MEXU, CAS); 20 May 1981, Along road between Highway 3 and Rancho Mike in the Sierra de San Pedro Martir 7.8 miles SW of Highway 3, *T. F. Daniel 1399* (CAS); 2 June 1963, Sierra San Pedro Mártir. Rancho La Suerte, *R. Moran 11076* (NY, SD); 4 June 1963, Sierra San Pedro Mártir. Santa Eulalia, *R. Moran 11133* (NY, SD); 6 May 1963, Sierra San Pedro Mártir. Rancho San Matias, *R. Moran 10841* (NY); 2 June 1975, San Isidoro, *R. Moran 22290* (MEXU, NY, SD); 27 February1963, Trail from Terminal to San Juan Valley, *R. S. Cowan 2345* (CAS, ENCB, MEXU, NY, SD, US); 8 June 1986, Sierra San Pedro Mártir: a few miles below entrance to Parque Nacional, *R. F. Thorne 62007, T. S. Elias, P. Rojas* (NY); 7 July 1968, Sierra San Pedro Mártir. Rancho Concepción, *R. Moran 15293* (NY, SD); 4 June 1963, Rancho La Suerte, on W slope of S end of Sierra San Pedro Mártir, *R. F. Thorne 32021* (MEXU, NY); 14 April 1973, On north slope of Cerro Azufre. Seen to top of Tres Vírgenes, *R. Moran 20498* (NY, SD); 31 May 1975, Sierra San Pedro Mártir, 1 mile west of ex-Misión San Pedro Mártir, *R. Moran 22108* (NY, SD); 4 June 1963, In sand at bottom of Big Arroyo, Rancho La Suerte; on W slopes of S end of Sierra San Pedro Mártir 30.58 , 30.58–115.33 1130 m, *R. Moran 32073* (CAS); 12 May 1941, Sandy soil on flat near bank of the stream, Los Emers, southern park of Sierra San Pedro Martir, 1067 m, *I. L. Wiggins 9911* (CAS, US); 16 June 1954, 7 miles from canyon mouth, Canyon del Diablo, to the north and west of Pcacho del Diablo (Cerro La Encantada), eastern flank of Sierra San Pedro Martir, *604A* (CAS, MEXU); 7 June 1941, Open slope among Pine-Oak association, La Encinal, west side of Sierra San Pedro Martir, 1829 m, *I. L. Wiggins 9796* (CAS, US); 27 February1963, Sierra San Borja, near El Terminal, 16 miles SW of Bahia de los Angeles, *R. F. Thorne 32733, J. Henrickson* (MEXU, NY); 4 June 1963, Big Arroyo, Rancho La Suerte on west slopes of soth end of Sierra San Pedro Martir, *R. F. Thorne 32073* (CAS); 30 April 1987, Rancho La Concepción 33 km SW de el Observatorio, San Pedro Martir, *P. Tenorio 13182, C. Romero* (CAS); 5 June 1963, Ca. 2 miles S of Rancho La Suerte, *R. F. Thorne 32108* (NY); 27 February1963, Sierra San Borja, Occasional locally at pass west of El Terminal 28.75 , 28.75–115.6 1200 m, *R. Moran 10243* (TEX-LL, US); 3 April 1950, East end of Sierra San Luis, 26–30 miles north of Punta Prieta, 1280–1463 m, *H. S. Gentry 8952, F. Cech* (SD, US); 27 February1963, *R. Moran 10245* (BCMEX, SD); 12 August 1979, On silty flat, 1.0 km east of Bahía San Quintín, *R. Moran 27970* (SD); 24 December 1963, In wet sand of arroyo, below El Alamoso. *R. Moran 11408* (SD); 28 June 1970, Sierra San Pedro Martir; ridge west of Lower Corona, *R. Moran 17930* (SD); 2 September 1974, Sierra San Pedro Martir; north of Oak Pasture, *R. Moran 21324* (SD); 1 May 1976, Mouth of Arroyo Taraizo, *R. Moran 22951* (SD); 26 March 1960, South end of Valle de San Juan, *R. Moran 8063* (ENCB, SD); 24 November 1976, Open southeast slope of Cerro la Laguna, highest peak of Sierra San Francisco, *R. Moran 23845* (SD); 12 February1964, In crater, Volcan las Tres Vírgenes, *R. Moran 11683* (SD); 20 April 1994, Sierra San Francisco, just southeast of town of San Francisco de la Sierra, *J. Rebman, Skeboo, W. Hodgson 8122* (SD); 2 July 1998, Sierra san Pedro Martir, Arroyo de Soto, km 75 camino al Observatorio, orillade camino, *J. Delgadillo s.n.* (SD); 15 March 1995, Canon el Cajon, west of main dirt road providing access to Canon de Guadalupe, *J. Rebman, A. Salywon, R. P. Martínez, G. Reihardt, W. Hodgson 8736* (SD); 22 April 2009, Sierra La Libertad: vicinity of Las Cuevas; in Arroyo La Soledad and surrounding lower slopes, *J. Rebman 17173, S. Bullock* (SD); 17 October 2012, Rancho Iraq. Southern Sierra San Pedro Martir, S. *Vanderplank 121017-19, A. Harper, J. Campos, C. de la Rosa* (SD); 21 July 1988, Cerca de La Corona de Abajo, 0.75 millas arriba de la carretera principal desde la puerta de entrada, Sierra de San Pedro Mártir, *S. Boyd 2812* (MEXU); 3 May 1987, Rancho La Concepción 33 km SW de el Observatorio, San Pedro Martir, *P. Tenorio L. 13287, C. Romero de T.* (MEXU); 2 June 1963, Rancho La Suerte, base of Sierra San Pedro Mártir, *R. F. Thorne 31898* (ENCB). **BAJA CALIFORNIA SUR:** 8 January 1948, Flood plain between lava-capped mesas and the Patrocinio salt works, southeast of Laguna de San Ignacio, *A. Carter 2509* (MEXU, NY, US); 24 February2007, *D. Valov 2007042* (SD).

77. *Astragalus pueblae* M. E. Jones, Contr. W. Bot. 14: 35. 1912

Type:—MEXICO, Puebla, Esperanza, foothills of Sierra Madre Oriental, near Pico de Orizaba, September 1911, *Purpus 5645* (holotype: POM no me lo pasa el CCH1: isotype: GH00059431 digital image, MO-128352 digital image!, US00001529 digital image!, RSA0003070 digital image!, NY00005835!).

Atelophragma pueblae (M. E. Jones) Rydb., Bull. Torrey Bot. Club 55: 164. 1928.

Perennial. Stems up to 60 cm long, thin, diffuse, branched from base and above, minute strigose, the trichomes up to 0.3 mm long, appressed. **Stipules** 1–2.5 mm long, triangular, the upper ones amplexicual and free, the lower ones connate. **Leaves** 3–7 cm long, leaflets 11–15, linear, the pairs separated from each other, apically obtuse, folded, adaxially glabrate, abaxially somewhat pubescent. **Peduncles** 3–4.5 cm long, thin; the racemes very short, 4.5–10 mm long, compact umbel-like, flowers few, 7–12. **Flowers** purple to pale purple; the calyx 2.4–3 × 1.5–1.9 mm, minute

strigose, trichomes black and few white ones, the tube 1.6–2 mm long, campanulate, the teeth 0.5–1 mm long, subulate, the sinus deeply rounded and wide among them; the banner 6 × 3.2–3.5 mm, ovate to rhombic, recurved; the wings 5–6 × 1.4–1.6 mm, the claw 2–2.4 mm long, the blade 4–4.3 mm long, oblong to obovate, slightly oblique; the keel 4–4.3 × 1.6–1.8 mm, the claw 2–2.3 mm long, the blade 2.3–2.5 mm long, obovate, incurved. **Pod** deflexed, subsessile, 7–8 × 2–3 mm, oblong to obovate, triquetrous, obcompressed, basally obtuse, distally ending in a short beak, lateral faces obtuse, ventrally carinate, dorsally widely sulcate, the valves thin, minute strigose, papery, ochre or brown with age, septum absent; seeds 1.3–1.5 mm long, mitten shaped, brown, somewhat opaque.

Distribution:—Endemic to Mexico, exclusively of Puebla (Esperanza, 18°51'47''N–97°22'35''W), a single record for Mexico, 2462 m (Fig. 23).

Habitat:—Apparently in coniferous forest.

Comments:—The area of distribution and adjacent adjacent areas of this species is habitat of five other species with triquetrouss pods, but *A. pueblae* is the only one with very short racemes, 5–10 mm long, resembling a small umbel and with small (7–8 mm long) unilocular, oblong to obovate, but triquetrous pods.

Specimens examined:—PUEBLA: IX-1911, Esperanza, *C. A. Purpus 5645* (JEPS, MEXU).

78. *Astragalus purpusii* M. E. Jones, Contr. W. Bot. 14: 34. 1912

Type:—MEXICO, Coahuila, Sierra de Parras, 9000 ft. alt., July 1910, *Purpus 4582* (holotype: POM (not found at CCH1 or may be, it is RSA0003071 digital image!; isotype: GH00059430 digital image!).

Atelophragma purpusii(M. E. Jones) Rydb., Bull. Torrey Bot. Club 55: 164. 1928.

Perennial. **Stems** 5–27 cm long, diffuse, prostrate, procumbent or extended, forming radial colonies, minute strigose, the trichomes up to 0.7 mm long. **Stipules** 1–5 mm long, clasping, connate, constituting a loose sheath, attached for a half of 2/3 its length around the stem´s circumference. **Leaves** 1.5–5.8 cm long, leaflets 13–23, 1.5–6.4 mm long, oblong to obovate, truncate o retuse, adaxially glabrate. **Peduncles** 1.5–4.5 cm long; the racemes 0.5–1.6 cm long, flowers 7–22. **Flowers** purple, purple with white tones; the calyx 2.4–3.6 × 1.3–1.6 mm, strigose, the trichomes black, the tube 1.5–2.2 mm long, campanulate, the teeth 0.7–1.6 mm long, subulate, one pair shorter than the rest; the banner 4.5–7.6 × 3–5 mm, recurved, obovate to suborbicular, basally narrow, wide notched apically; the wings 4.1–5.7 × 0.9–2 mm, the claw 1.5–2.2 mm long, the blade 2.8–4.5 mm long, oblanceolate to narrow obovate, oblique, incurved; the keel 3.5–4.3 × 1.3–1.5 mm, claw 1.5–2.2 mm long, the blade 2–2.5 mm long, obovate, apically oblique. **Pod** deflexed or spreading, 5–8 × 2.2–3.4 mm, sessile or subsessile, triquetrous, oblique, elliptic-trigonous to obovate-trigonous, base slightly cuneate, distally abruptly cuneate and contracted in a small, conic, 1 mm long beak, ventrally carinate, dorsally flattened or slightly sulcate, the valves minute strigose, papery, ochre, reticulate, septum complete or almost so; ovules 6–12; seeds 1.5–1.9 x 1–1.2 mm, mitten shaped, brown to pale brown, smooth, opaque.

Distribution:—Restricted to northeastern Mexico, southern Coahuila (Parras and Saltillo), central Nuevo León (Galeana) and northeastern Zacatecas (Concepción del Oro and Mazapil) (Fig. 23).

Habitat:—In clayey, alluvial, stony and calcareous soils; open areas; wet gullies; dwarf oak shrubland; chaparral; pinyon pine forest with maguey; burned areas with juniper and madrone; subalpine meadow, dwarf pine scrubland; pine-juniper dwarf scrubland; cold conifer forest with fir, Douglas fir, pine, oak; pine forest; roadside; 2500–3650 m.

Comments:—Within the range of *A. purpusii*, another seventeen species of *Astragalus* can be found, but in spite of this rich diversity, many of those species are associated with shrublands of arid and semi-arid zones, few are associated with oak forests or cold coniferous forests communities obove 2,500 m in elevation. Among these species are *A. hypoleucus, A. sanguineus*, and *A. legionensis*. Out of these four species, *A. hypoleucus* can be easily distinguished by its dolabriform trichomes and *A. sanguineus* by its large red flowers. *A legionensis* is distinguished from *A. purpusii* by its racemes with fewer flowers (1–5), calyx almost twice the length (6.5–7.9 mm long), larger petals (banner 9.6–14 mm, wings 6.5–8.8 mm , the keel 7.4–8.4 mm) and oblong to elliptic (not triquetrous), 14–15 mm long, stipitate (stipe 2–2.5 mm long) pods.

Specimens examined:—COAHUILA: 12 May 1985, Sierra del Coahuilón, Arteaga, Coahuila *G. B. Hinton 18830* (CIIDIR, ENCB, MEXU); 14 July 2014, Sierra el Coahuilon, Coahuila *J. A. Encina 3881, Z. A. Zamora, A. García M.* (ANSM); 27 May 1982, 6 km al SE de San Antonio de las Alazanas, Coahuila , *J. A. Villarreal 1685* (ANSM); 21 June 1976, McGill, Reeves and Nash, Coahuila , Road past San Antonio, ca. 30 mi E of jct. Rte. 57, *McGill, Reeves, Nash, D. J. Pinkava P13574* (NY); 5 July 1941, On south slope of mountain, 24 kilo. northwest of Fraile, *L. R. Stanford 417, K. L. Retherford, R. D. Northerall* (CAS, NY); 14 May 1973, Sierra de Parras; footrail from

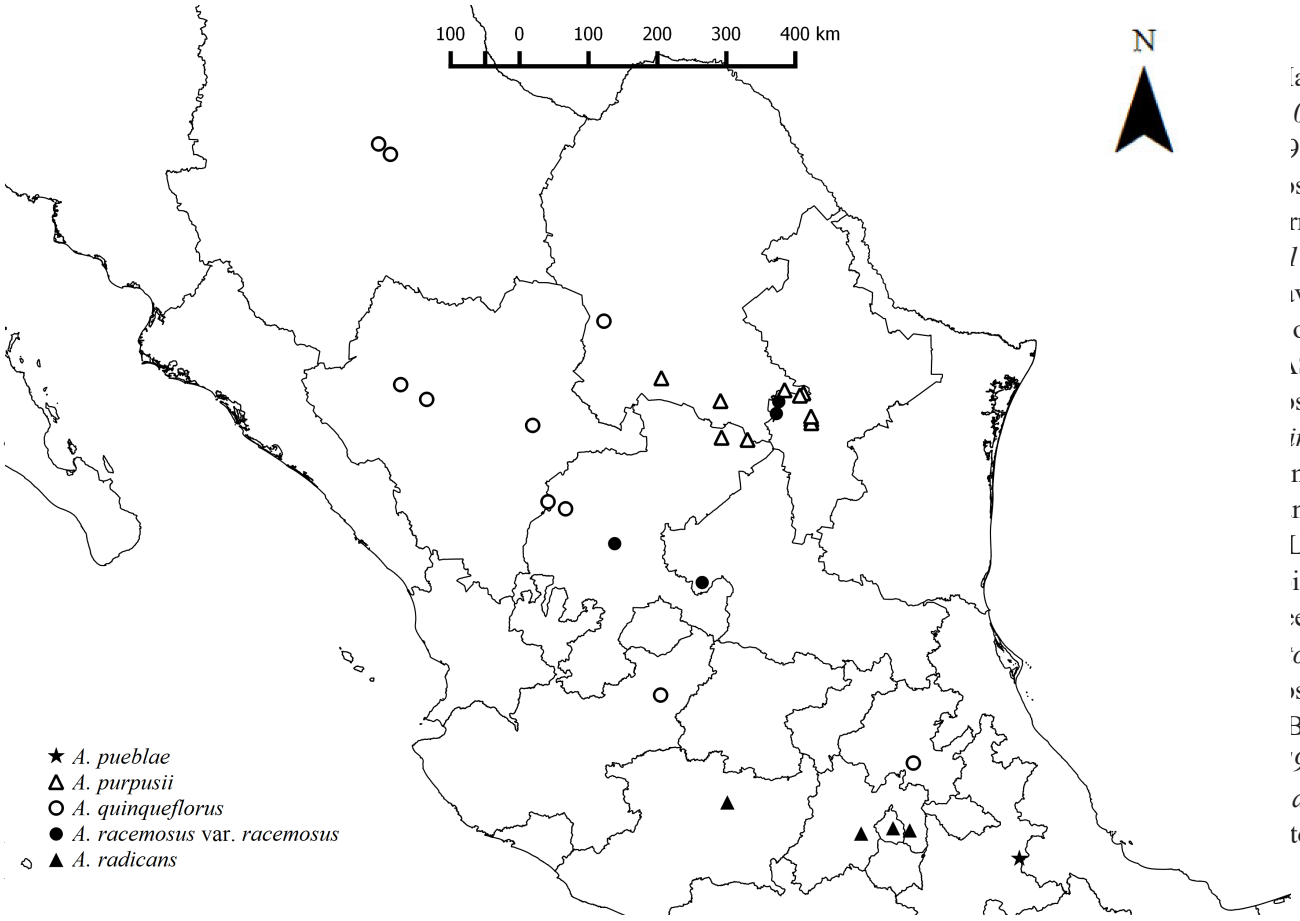

FIGURE 23. Map showing the distribution of *Astragalus pueblae, A. purpusii, A. quinqueflorus, A. racemosus* var. *racemosus,* and *A. radicans* in Mexico.

79. *Astragalus quinqueflorus* S. Watson, Proc. Amer. Acad. Arts 21: 450. 1886

Type:—MEXICO, Chihuahua, on the hills and plains near Chihuahua, April 1885, *Pringle 234* (holotype: GH00059432 digital image; isotype: US00001533 digital image!, NY00005836!, UVMVT024924 digital image!, F0058946F digital image!, MO-128353 digital image!).

Phaca quinquiflora (S. Watson) Rydb., N. Amer. Fl. 24(6): 361. 1929.

Perennial, but of short duration. **Stems** short, thin, radial, many, up to 15 cm long, the trichomes up to 0.6 mm long, straight, silvery or ashy. **Stipules** 1.3–3.2 mm long, amplexicual to semi-clasping, not connate, lanceolate to triangular or ovate. **Leaves** 2–17 cm long, leaflets 5–11, the pairs well separated from each other, 2–25 mm long, linear to oblong, obtuse or retuse, folded, subequal or the distal one the larger, adaxially glabrate or sub-glabrous. **Peduncles** 1–17 cm long; the racemes 3–4 cm long, lax, flowers 1–7. **Flowers** whitish, with purple tones; the calyx 2.4–3.6 × 1.3–1.6 mm, strigose, trichomes white, the tube 1.5–2 mm long, the teeth 0.6–1.7 mm long, subulate; the banner 4.4–5.4 × 2.6–3.8 mm, obovate to rhombic, recurved, slightly retuse; the wings 4–4.6 × 1–1.3 mm, the claw 1.5–1.8 mm long, the blade 2.9–3.3 mm long, oblong to oblanceolate, oblique-incurved; the keel 3.2–3.8 × 1.3–1.8 mm, the claw 1.2–1.8 mm long, the blade 1.7–2.1 mm long, strongly incurved. **Pod** 6–11 × 3–4.5 mm, sessile, deflexed, frequently humistrate with age, triquetrous, sometimes inflated-trigonous, oblique, ovoid, oblongo to elliptic, straight o gently incurved, basally rounded, distally contracted in a short subulate beak, laterally compressed, ventrally well raised and evident keeled, dorsally superficially sulcate, laterally slightly convex with the faces obtuse or somewhat rounded, the valves thin, strigose, trichomes white, papery and ochre with age, finely reticulate, septum almost complete; ovules 8–14; seeds 1.2–2.4 mm long, mitten shaped, brown to olive, occasionally purple tinted.

Distribution:—Endemic to Mexico, mainly in northern Mexico, central Chihuahua (Chihuahua and Aquiles Serdán), central-western Coahuila (Cuatrociénegas), Durango (Santiago Papasquiaro, Luis Moya and Tepehuanes), to western (Sombrerete) and central (Zacatecas) Zacatecas, Only one collection recorded in southern Mexico (Jalisco, *R. McVaugh 16982* (MEXU) (Fig. 23).

Habitat:—Rocky hillsides, thornscrub; arid and gravel plains; calcareous soils; arid thickets; arid grasslands; acacia scrublands; 1450–2100 m.

Comments:—At least sixteen other *Astragalus* species inhabit the same distributional areas of *A. quinqueflorus*, but only six of them have triquetrous sessile pods and simple trichomes (*A. goldmanii, A. hartwegii, A. nothoxys, A. nuttallianus,* and *A. pringlei*). *Astragalus quinqueflorus* is distinguished from all of them by its weak appearance, short stems, no larger than 12 cm long, linear leaflets, peduncles much larger than leaves, few flowers per cluster (1–7) coupled with their tiny flowers, none of other mentioned species have flowers as small as this species, especially the keel length (which never reaches 4 mm long).

Specimens examined:—CHIHUAHUA: 8 April 1885, Plains near Chihuahua, *C. G. Pringle 234* (NY); IV-1886, Hills and plains near Chihuahua, *C. G. Pringle 711* (NY, US); 10 March 1985, Wash near Potrero de Mapula village, at the base of the Sierra Santa Eulalia, *P. F. Zika 8535* (NY); 4 April 1888, Chihuahua, *Wilkins s.n.* (US); 9 March 1997, Chihuahua, Chihuahua *E. Estrada 6891* (ANSM, CFNL, MEXU); ? April 1887, Hills and plains near Chihuahua. Photograph of specimen only, *C. G. Pringle s.n.* (MEXU). **COAHUILA:** 3 September 1941, *I.M. Johnston* (TEX-LL). **DURANGO:** 25 March 5 April 1906, At Tepehuanes, *E. Palmer 25* (JEPS, NY); 10 November 1963, Luis Moya, *H. D. Ripley 13507, R. C. Barneby* (NY, US); 19 March 1983, 3–5 km al Oeste de La Soledad, 11 km NW Santiago Papasquiaro, *R. C. Díaz 113* (NY); 30 May 1981, Hidalgo—B. Urías,*J. G. Ochoa 8* (MEXU). **HIDALGO:** 20 November 1976, extremo NW de la Ciudad de Pachuca (barrio Las Peñitas), *M. Medina 1812* (ENCB). **JALISCO**: 15 August 1958, *R. McVaugh 16982* (MEXU). **SAN LUIS POTOSÍ:** 21 September 1973, 3 km. al Este de Sta. Efigenia, *J. Villa V. s.n.* (MEXU), **ZACATECAS:** VIII-1903, Zacatecas, *C. A. Purpus 136* (JEPS, US); 8 November 1963, El Calabazal, *H. D. Ripley 13475, R. C. Barneby* (NY); 8 November 1963, 2 miles e. of Sombrerete, *H. D. Ripley 13458* (NY).

80. ***Astragalus racemosus*** Pursh var. ***racemosus*** Pursh, Fl. Amer. Sept. (Pursh) 2: 740. 1813

Type:—USA, Louisiana, In Upper Louisiana. Bradbury, December 1811, *J. Bradbury s.n.* (holotype: PH (not found); isotype BM000522133 digital image!).

Astragalus racemosus Pursh, Fl. Amer. Sept. (Pursh) 2: 740. 1813.—*Tragacantha racemosa* Kuntze, Revis. Gen. Pl. 2: 947. 1891.—*Tium racemosum* Rydb., Bull. Torrey Bot. Club 32: 659. 1906.—*Astragalus racemosus* Pursh var. *typicus*, Ced. Porter, Madroño 8: 99. 1945.—*Astragalus racemosus* Pursh var. *brevisetus* M. E. Jones, Proc. Calif. Acad. Sci. ser. 2, 5: 662. 1895; *Tium brevisetum* Rydb., N. Amer. Fl. 24(7): 386. 1929.

Astragalus galegoides Nutt., Gen. N. Amer. Pl. 2: 100. 1818;

Perennial. Stems up to 75 cm long, strong, erect, suberect to decumbent, sometimes diffuse branched, densely and minute strigose, trichomes up to 0.6 mm long, appressed. **Stipules** 3–12 mm long, amplexicual and connate (the lowest ones), commonly bidentate, the lowest ones little wider than longer, rarely embracing the stem tightly, the middle ones connate but only to the middle of its length or only in the lower part, the upper ones free or almost so, triangular, wide triangular to triangular-lanceolate. **Leaves** 4–5.8 cm long, leaflets 10–37, 1–3.7 cm long, narrow linear, oblong to elliptic, of thick texture, glabrate, with minute papillae. **Peduncles** 3–11 cm long, erect or curved with age; the racemes 3–22 cm long, flowers 15–70. **Flowers** lavender, whitish, rose purple, concolor or the veins purple; the calyx 7.3–10.5 × 3.2–5.5 mm, cylindric, cylindric-campanulate, sometimes cylindric-turbinate, lavender to pinkish, fine strigose, trichomes white, or white and black mixed, rarely only black trichomes, the tube 4.7–9 mm long, basally truncate, the teeth 1.5–3.7 mm long, subulate; the banner 15.4–19 × 6–10.7 mm, recurved; wings 12.4–19 × 2.2–3.8 mm, the claw 5–8.2 mm long, the blade 8.7–12.4 mm long, oblong to oblanceolate; the keel 10.6–15.4 × 2.3–3.8 mm, the claw 4.7–8 mm long, the blade 7.2–10.3 mm long, oblique, obovate, incurved. **Pod** 14–30 × 3–6 mm, deflexed, stipitate (stipite 3.5–7.4 mm long), triquetrous, compressed, linear, oblong to elliptic, narrowed at both ends, occasionally basally somewhat truncate, distally ending in a cuspidate beak, straight to slightly curved, lateral and ventral faces acute but obtuse, doraslly and ventrally somewhat flattened, sometimes dorsally somewhat convex, the valves thin, glabrate, rarely minute strigose, turning papery, ochre or green, shiny, reticulate; septum absent or scarcely developed, incomplete; ovules 12–22; seeds 2.6–3.3 mm long, mitten shaped, brown, smooth or little shiny.

Distribution:—Locally distributed in three areas of northeastern Mexico, Nuevo Léon (Galeana), Zacatecas (Matías Ramos) and San Luis Potosí (Salinas). Also, in Canada and USA (Fig. 23).

Habitat:—Calcareous and gypsic soils; plains; halophytic grasslands with prairie dog colonies; adjacent to water deposits in saline areas; 1600–2000 m.

Comments:—The calcareous or gypsic soils of northeastern Mexico are home to various species of *Astragalus*, many of which are restricted to grasslands and semi-arid shrublands such as: *A. coriaceus, A. diphacus, A. hypoleucus, A. mollissimus var. irolanus, A. nuttallianus var. austrinus, A. racemosus* var. *racemosus, A. sanguineus* and *A. wootonii* var. *candollianus* Of these, only *A. hypoleucus, A. nuttallianus* and *A. racemosus* possess triquetrous pods, but can be easily differentiated by the presence of dolabriform trichomes in *A. hypoleucus* and the sessile pods of *A. nuttallianus*.

Specimens examined:—NUEVO LEÓN: 19 July 1999, Ejido La Casita, por la carretera San Rafael-La Hediondilla, Mpio. Galeana, *E. Estrada 10309* (CFNL); 4 August 1999, Ejido La Hedionda, Municipio Galeana, *E. Estrada 10495, C. Yen* (CFNL); 3 June 2003, Ejido La Hediondilla y Ejido La Casita, *E. Estrada 15891* (CFNL); 10 June 1982, San Gerardo, Mpio. Galeana, *Hinton 18372* (IEB, TEX-LL); 24 May 1973, 59 km N. of San Roberto Junction on the Matehuala-Saltillo highway, 19 km S. of the Coahuilla state line, *M. C. Johnston 11207, T.L. Wendt, F. Chiang C*. (MEXU). **SAN LUIS POTOSÍ:** 23 April 1963, *Laguna de Salinas, A. Gómez 834* (ENCB)*, 835* (ENCB, MEXU, NY); 30 June 1979, Mpio. Salinas, i km al N de Salinas, *E. García M. s.n.* (ENCB, MEXU, NY). **ZACATECAS:** 5 May 1892, Ramos, *M. E. Jones 150* (CAS).

81. ***Astragalus radicans*** Hornem., Hort. Bot. Hafn. 2: 708. 1815

TYPE:—Mexico: "Hab. F. intr. 1808 *sub. nom.* Astr. Radicans Humb.". *Humboldt & Bonpland s.n.* Lectotype (designated here):—MEXICO, at C, C10011808 (isolectotypes, at C, C10011807)**.** Grown from seed at the Botanical Garden of Copenhagen. The specimen that best matches the description was chosen [digital image! Available at https://plants.jstor.org/stable/10.5555/al.ap.specimen.c10011807?searchUri=filter%3Dname%26so%3Dps_group_by_genus_species%2Basc%26Query%3DAstragalus%2Bradicans].

Astragalus reptans Humb. & Bonpl. ex Willd., Hort. Berol. 2: 88, Tab. 88. 1816.—"Astragalus reptans *de Humb. and Bonpl*… Habitat in Mexico." *A.J.A. Bonpland* s.n. (lectotype at Herbarium Willdenow in Herbarium Berlin (B), B-W 13988-010, isolectotypes (designated here)**:**—MEXICO, at P, P00135206; P00135207; P00135208). Wrongly cited as *Astragalus reptans* Willd., Hortus Berolinensis 2: 88, pl. 88. 1809.

Craccina reptans (Willd.) Steven (1832: 266).—*Tragacantha reptans* Kuntze (1891: 947).—*Atelophragma reptans* Rydb. (1928: 159).

Perennial. **Stems** up to 1 m long, prostrate, creeping, rooting in nodes, the trichomes up to 0.6 mm long, appressed. **Stipules** 7–12 mm long, elliptic, obovate to almost orbicular, connate, attached to the half of its length o little more, wider than stems. **Leaves** 10.5–30 cm long, leaflets 27–33, 18–28 mm long, oblong, elliptic, obtuse, truncate and apiculate, adaxially glabrate or sparsely so, abaxially strigose. **Peduncles** 7–27 cm long, erect, perpendicular to foliage growth, trichomes black; the racemes 2.5–6 cm long, flowers 20–34. **Flowers** yellow, cream, yellowish to ochrolecous; the calyx 7–9 × 3–3.8 mm, strigose, trichomes mainly black, the tube 4–5 mm long, campanulate, the teeth 2.5–4 mm long, lanceolate, ventral pair wider; the banner 14–15 × 5–7 mm, elliptic, oblong to oblanceolate, shallowly notched, the wings 12.5–15 × 2.2–2.7 mm, the claw 5–6 mm long, the blade 7–9.5 mm long, narrowly oblong oblique, elliptic; the keel 9–12.6 × 2.3–3.4 mm, the claw 4.4–5.6 mm long, the blade 4.2–6.5 mm long, distally oblique. **Pod** deflexed, subsessile or very shortly stipitate (stipe 0.4–1 mm long), oblong to elliptic, 15–22 × 5–8.3 mm, dorsoventrally compressed, basally rounded or narrowed, distally abruptly apiculate, ventrally carinate, dorsally open and shallowly sulcate, the valves rigid, papery, strigose, trichomes black or rarely also with white trichomes, mixed, septum incomplete; ovules 19–30; seeds 1.8–2.6 mm long, mitten shape, pale-brown to brown, opaque.

Distribution:—Endemic to Mexico, recorded in Mexico City and adjacent areas in the states of Mexico (Naucalpan, Ixtapaluca and Chalco) and Michoacán (Iratzio, Cerro El Águila, 19°37'N–101°24'W) (Fig. 23).

Comments:—The areas where *A. radicans* is found is also habitat for *A. esperanzae, A. guatemalensis, A. hypoleucus, A. lyonnetii, A. micranthus, A. mollissimus, A. oxyrhynchus, A. strigulosus,* and *A. tolucanus*. Of this group of species, four of them are characterized by their elliptic to oblong pods (never triquetrous), *A. guatemalensis, A. radicans, A. strigulosus* and *A. tolucanus*, and with the exception of *A. radicans*, none of these species produce roots at the floral nodes.

Specimens examined:—**MEXICO CITY**: Chapultepec, *Bilimek 107* (NYBG); knoll of low meadows, Valley of Mexico, 7300 ft, *C. G. Pringle 6315* (NYBG). **MICHOACÁN**: Municipio Santa Clara del Cobre, Ejido Casas Blancas, 2400 m snm, *J. M. Escobedo 1044* (IEB); Municipio Santa Clara del Cobre, 2 km rumbo al Cerro San Miguel, *J. M. Escobedo 1470* (IEB). **STATE OF MEXICO**: orilla de una milpa situada al E del sitio Arqueológico Tlapacoyan, cerca de la autopista, *J. Espinoza G. s.n.,* (NYBG); Municipio de Chalco, 2 km al S. de Tlapacoyan, 2250 m snm, *Rzedowski 29055* (ENCB); Municipio Chalco, 2 km al S. de Tlapacoya, 2250 m snm, *Rzedowski 29055* (ENCB).

82. ***Astragalus regiomontanus*** Barneby, Mem. New York Bot. Gard. 13: 168. 1964

Type:—MEXICO, Nuevo León, Sierra Madre near Monterrey, 22 August 1889, *C. G. Pringle 2887* (holotype: isotype: MEXU01169238!, GH00059434 digital image!, MEXU00154981!).

Perennial; **Stems** up to 160 cm long, erect, one or several stems from base, basally solid or hollow (when young), striate, branched distally, minute strigose, the trichomes up to 0.3 mm long, basally glabrate or almost so. **Stipules** 2–4 mm long, semi-clasping, not connate, deltoid to triangular, some decurrent. **Leaves** 3.5–12 cm long, leaflets 9–23, 5–18 mm long, oblong to ovate, retuse, bicolored, abaxially clearer and pubescent, adaxially glabrate. **Peduncles** 2–5.5 cm long; the racemes 2–5.5 cm long, flowers 7–15. **Flowers** white, deflexed; the calyx 5.5–6.1 × 2.7–2.9 mm, strigose, trichomes white, the tube 3.3–3.8 mm long, campanulate, the teeth 2.6–2.9 mm long, subulate; the banner 9–11 × 4.8–5.8 mm, obovate to rhombic, retuse; the wings 9–10.5 × 1.4–2.3 mm, the claw 3.4–3.8 mm long, the blade 7–7.6 mm long, elliptic to oblanceolate, sub-oblique, incurved; the keel 7.4–8 × 2.2–2.4 mm, the claw 3.4–3.8 mm long, the blade 4.4–4.9 mm long, distally oblique, obovate. **Pod** 1.9–2.6 × 0.4–0.5 cm, deflexed, stipitate (stipe 1.5–2 mm long), triquetrous, compressed, oblong to elliptic, semi-straight or incurved, lateral faces obtuse, ventrally carinate, dorsally wide and openly sulcate, the valves glabrate, papery, turning somewhat rigid with age, ochre, strongly reticulate, septum incomplete; ovules 10–14; seeds 2.6–2.8 mm long, mitten shaped, brown, smooth.

Distribution:—Endemic to Mexico, inhabiting the mountains of central Nuevo León (Linares, Montemorelos and Santiago) (Fig. 24).

Habitat:—Clay soils; shallow or steep slopes; open vegetation; humid canyons; oak forest; oak-pine forest; 1200–1800 m.

Comments:—Six species in Nuevo Leon possess triquetrous pods, of which *A. regiomontanus* is easily distinguished by its white petals and stipitate podswhich are not found in the other species.

Specimens examined:—NUEVO LEÓN: 4 April 2003, Ejido la Trinidad, Mpio. Montemorelos, *C. Yen, E. Estrada 15433* (CFNL); 2 July 2003, Rancho El Encino, 23 km al SW de Linares, por la carretera rumbo a Iturbide, *C. Yen, E. Estrada 15803* (CFNL); 27 July 2003, Rancho El Encino, aprox. 23 km al oeste de Linares, por la carrtera rumbo a Iturbide, *C. Yen, E. Estrada 15814* (CFNL); 30 July 2003, Linares, N.L, *C. Yen, E. Estrada 15133* (ANSM, CFNL); 25 August 1889, Sierra Madre near Monterrey, *C. G. Pringle 2559* (NY, US); 4 April 2003, Rancho el Encino, Mpio. Linares, *E. Estrada 15444, C. Yen* (CFNL); 1934, Sierra Madre Oriental, near Monterrey, *C. H. Muller 492* (MEXU).

83. ***Astragalus rupertii*** Villarreal & M. A. Carranza, Brittonia 46(4): 335. 1994

Type:—MEXICO, Coahuila, Mpio. de Saltillo, Estación Vega, carr. 40, aprox. 8 km W de Saltillo, 1800 m, 5 Jun 1992, *J. A. Villarreal 6644, 311. M. A. Carranza, D. E. Lozano & S. Comparán*. (holotype: MEXU00640825!; isotype: NY00887990!, TEX00000534!, CIIDIR043799 digtial image!).

Perennial. **Stems** up to 50 cm long, erect or ascending, pubescence dense, white-villous, trichomes up to 0.8 mm long, straight, dense. **Stipules** 2–5 mm long, free, triangular, lanceolate, the lowest ones slightly auriculate. **Leaves** 5–8 cm long, leaflets 17–23, 5–20 mm long, elliptic to obovate, retuse, adaxially appressed and scattered pubescent, abaxially similar, but denser. **Peduncles** 5–15 cm long, straight or incurved; the racemes 3–10 cm long, lax, flowers 10–20. **Flowers** blue-violet, basally whitish, ascending to deflexed with age; the calyx 8 × 3.5 mm, strigose, trichomes black short, and longer white ones scattered, the tube 3–5 mm long, urceolate to oblong-urceolate, the teeth 3 mm long, triangular or subulate; the banner 14 × 6 mm, oblanceolate, retuse; the wings 12 × 2 mm, the claw 4 mm long, the blade 8 mm long, oblong to oblanceolate; the keel 9 × 3.5 mm, the claw 4 mm long, the blade 5 mm long, straight or obliquely apically. **Pod** 6 × 4 mm, susbsessile or minute stipitate, oblique, elliptic to sub-oblong, widened, but not inflated like a bladder, laterally compressed, basally wide-rounded, distally contracted abruptly in a short triangular beak and the style persistent for a period of time, ventrally sulcate along the suture, dorsally wide and openly sulcate, the valves rigid, scattered strigose, septum complete, the pod thence bilocular; ovules 4; seeds 2.3 mm long, mitten shaped, brown-reddish, smooth, shiny.

Distribution:—Endemic to Mexico, exclusively in Coahuila, recorded only at two localities in the southeastern part of the state, in Saltillo and General Cepeda (Fig. 24).

Habitat:—Locally abundant in some localities, in chaparral and disturbed vegetation, maguey thickets, and oaks; 1600–1950 m.

Comments:—Excluding the species with dolabriform pubescence, triquetrouss pods and those with different but stipitate pods, the geopolitical border between Nuevo León and Coahuila, harbor three other species with widened, sessile pods, *A. diphacus, A. mollissimus,* and *A. pomphocalyx*. The pod of *A. diphacus* is didymous (pod stongly constricted dorsoventrally in the central part, constituting two inflated chambers, the pod notched at apex), *A. mollissimus* can be discerned by its relatively large leaves (the largest at least 12 cm long), larger petals (banner 15.3–25 mm, wings 14.5–20 mm, keel 11–13.6 mm) than the other species. *Astragalus pomphocalyx* and *A. rupertii* possess widened, subglobose, oblique-elliptic to sub-oblong, relatively small (6–8 × 4–6 mm, long and wide respectivelly) and pubescent pods. However, *A. pomphocalyx* has shorter (or almost as long as leaves, rarely surpassing them) peduncles (3–5 cm long), compact racemes even at maturity, 2–5 cm long, and among the most distinctive characteristic is its strongly urceolate-globose calyx, 9–10 mm long, with dense white strigose pubescence, contrasting characteristics with *A. rupertii*.

Specimens examined:—COAHUILA: 4 September 1992, Gral. Zepeda, *J. A. Villarreal 6701a, M. A. Carranza, J. Valdés* (ANSM, MEXU, TEX-LL); **5** June 1992, 8 km O de Saltillo, Coahuila, *J. A. Villarreal 6601, M. A. Carranza* (ANSM, CIIDIR); 1 April 1992, General Cepeda, 30 km W, *J. Neff 92-4-1-2* (NY, TEX-LL); 5 June 1992, Estación de Microondas Vega, 8 km W de Saltillo, Carr. (40), *J. Villarreal Q. 6656 & 6654, M. Carranza, S. Comparán, D. E. Lozano* (ANSM, NY); 5 June 1992, Saltillo, *J. A. Villarral 6601 & 6622b, M. A. Carranza, S. Comprarán, D. E. Lozano* (MEXU).

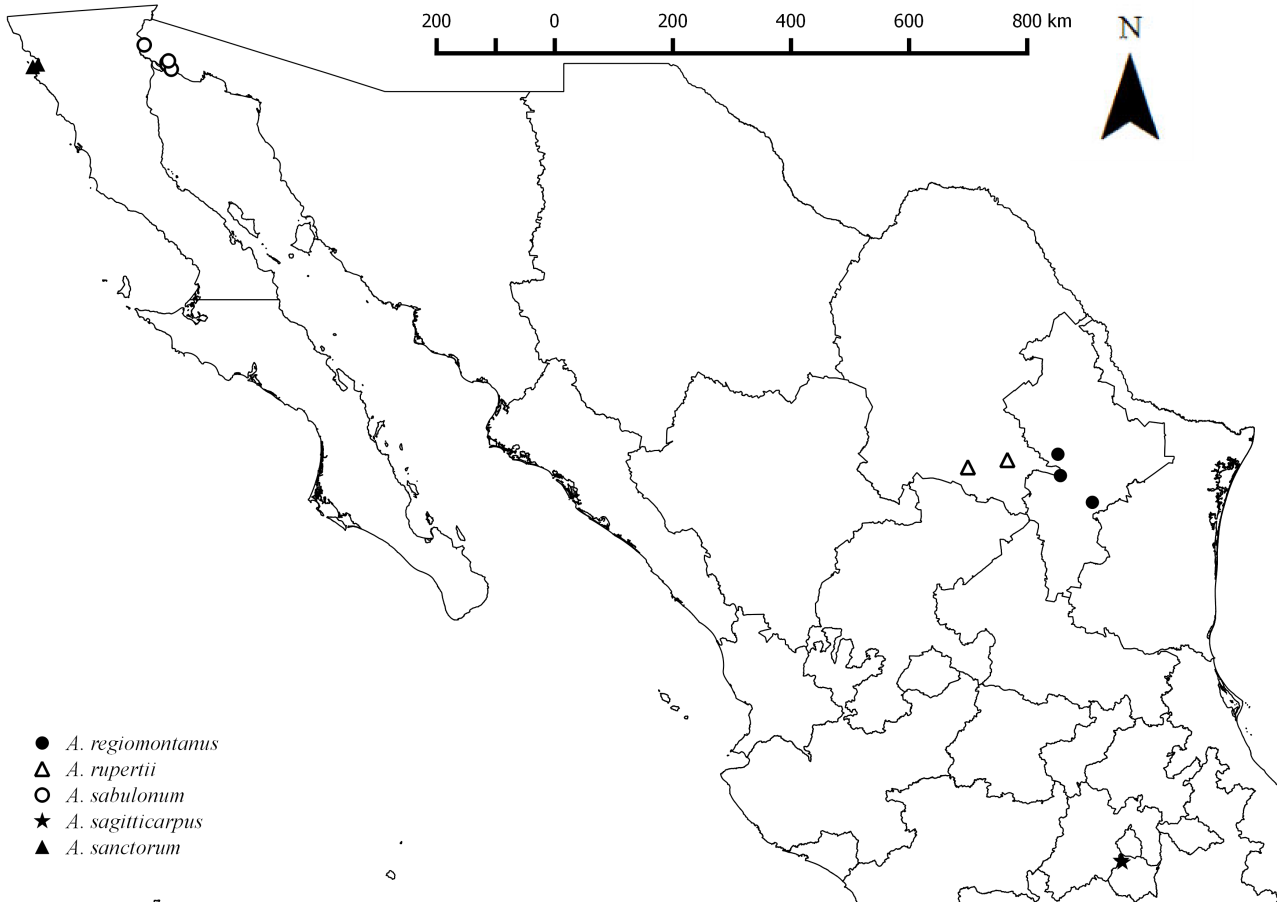

FIGURE 24. Map showing the distribution of *Astragalus regiomontanus, A. rupertii, A. sabulonuum, A. sagitticarpus,* and *A. sanctorum* in Mexico.

84. ***Astragalus sabulonum*** A. Gray, Proc. Amer. Acad. 13: 368. 1878

Type:—USA, Nevada, Southeastern border of Nevada, near the confluence of Muddy River with the Rio Virgen at Santo Thomas, on sandy ridges. 1877, *Palmer 110* (holotype: GH00058916 digital image!, US00001549!, MO-149287 digital image!, NY00005687 digital image!, AC00319843 digital image!, PH00005540 digital image!, NA0026156 digital image!).

Phaca sabulonum (A. Gray) Rydb., Bull. Torrey Bot. Club 40: 47. 1913.

Astragalus virgineus E. Sheld., Contr. U. S. Natl. Herb. 4: 88. 1893.
Phaca arenicola Rydb., N. Amer. Fl. 24(6): 356. 1929.
Phaca lerdoensis Rydb., N. Amer. Fl. 24(6): 356. 1929.

Annual or if **perennial,** of short duration**. Stems** up to 26 cm long, erect, diffuse, decumbent, straight or distally in zig-zag, commonly with purple tones, villous to hirsute, trichomes up to 1 mm long. **Stipules** 1–4 mm long, semi-clasping, decurrent, not connate, triangular to deltoid. **Leaves** 1.5–6.5 cm long, leaflets 5–15, 2–14 mm long, oblong to oblanceolate, basally narrowed, truncate, obtuses or notched apically, bicolored, abaxially clearer, adaxially somewhat glabrate along midvein. **Peduncles** 1–4 cm long; the racemes 0.5–2.5 cm long, flowers 2–7. **Flowers** ochroleucous, with purple or lilac tones, or only the veins of the banner purple or purple-lilac, or the banner only purple around the fold area; the calyx 3.3–6.2 × 1.8–2.7 mm, hirsute, trichomes white o rarely with few additional, scattered black trichomes, the tube 1.6–2.4 mm long, the teeth 1.7–3.6 mm long, subulate; the banner 5.2–7.2 × 3.8–5.4 mm, recurved, obovate to suborbicular, basally narrowed, basally ending in a minute claw, apically obtuse to wide notched; the wings 5.7–6.8 × 1.8–2.4 mm, the claw 1.8–2.4 mm long, the blade 4–5.3 mm long, oblique, obovate, somewhat incurved; the keel 5–6.5 × 2–2.3 mm, the claw 2–2.6 mm long, the blade 3–4.2 mm long, distally oblique, obovate. **Pod** 9–20 × 4–11 mm, sessile, spreading or deflexed, commonly humistrate when fruits ripen, oblique, ovoid, to ovoid-oblong, widened, but not inflated like a bladder, incurved, lunate, basally rounded or narrowed, commonly ventrally sulcate, distally contracted in a triangular beak, dorsally rounded or slightly and openly sulcate, the valves fleshy, thin, turning leathery o stiff-papery, green, turning ochre with age, sometimes with purple or dark-redish spots, hirsute to strigulose, the trichomes fine to dense, white; septum absent; ovules 10–19; seeds 2–2.5 mm long, brown, mitten shape, sometimes with purple tones, shiny.

Distribution:—In Mexico, found only in the northwestern Sonora in the Desierto de Altar (San Luis Río Colorado, Golfo de Santa Clara and La Salina). Also, in Arizona, New Mexico, California, Nevada, and Utah (USA) (Fig. 24).

Habitat:—Areas near (0.5 km) sandy dunes along the coast; vegetation with stabilized dunes, with psamophilic and halophitic vegetation; desert scrubland with creosote bush; sandy flat above high tidal zone, adjacent to tidal channels; 40–45 m.

Comments:—In the area of the Desierto de Altar, *A. aridus, A. insularis* var. *harwoodii* and *A. sabulonum* are all found. These species have a similar physiognomy, stems regularly ashy and racemes with few flowers (2–9), however, *A. aridus* is distinguished from these other by its smaller white with pink or lilac flowers, with its keel 3.6–5 mm long, and the banner almost always shorter than calyx teeth, and ascending, silky-canescent pubescent small pods (1–1.7 × 4.5–7 mm) with few ovules (3–7). The other two species have deflexed flowers and fruitswhen mature. *Astragalus insularis* var. *harwoodii* (purple-reddish) and *A. sabulonum* (ochroleucous, but with purple tints), have longer pods, averaging 13–29 mm, rarely 9–10 mm long, and a larger number of ovules, averaging10–19, rarely 7–9. The difference between these two last species is more subtle, in *A. insularis* the pubescence of the pod is short, appressed and straight, the trichomes shorter than 0.7 mm long, whereas in *A. sabulonum* the pubescence is villous, longer than 0.7 mm long, or if less than this size, those are curled or at least incurved. Most of time, peduncles and racemes are longer in *A. insularis*, up to 7 cm, and up to 6 cm, respectively. So far as we know, *A. sabulonum* is only distributed in northern Sonora in Mexico but it should be expected also in Baja Califronia.

Specimens examined:—SONORA: 5 March 1992, 6 March 1992, Ca. 12 airline km ESE of El Golfo de Santa Clara, ca, 0.5 km inland from shore, *R. S. Felger 92-188, K. Cliffton* (NY, TEX-LL); 23 March 1993, Delta del Río Colorado, Sonora ,*R. S. Felger 92-246, E. Glenn, V. Moretsky, D. Ortiz Reyna* (NY); 23 March 1993, Delta del Río Colorado, Sonora, *R. S. Felger 92-246, E. Glenn, V. Moretsky, D. Ortiz Reina* (MEXU, NY, USON); 27 March 1905, Mesa near Inter. Bound. Colorado river Sonora, *Mac Dougal 87* (NY); 27 March 1905, Mesa near Inter. Bound. Colorado river Sonora, *D. MacDougal 87* (NY); 23 March 1993, Delta del Río Colorado, Sonora, *R. S. Felger 92-246, E. Glenn, V. Moretsky and D. Ortiz* (NY); 6 March 1992, Sonora, *R. S. Felger 92-221, K. Cliffton* (CAS, MEXU, NY); 14 March 1993, Delta del Río Colorado, Sonora, *Felger 92-246, E. Glenn, V. Moretsky, D. Ortiz Reina* (MEXU, NY, USON).

85. ***Astragalus sagitticarpus*** A.E. Estrada, Villarreal & Encina, Phytotaxa 166–167. 2020

Type:—MEXICO, Morelos, Municipio Huitzilac, km 74 carretera (antigua) México-Cuernavaca, elev. 2300 m, 10 Nov 1978, *O. Téllez 526* (Holotype MEXU 1219252!).

Annual herb, caulescent. **Stems** suberect, curved, weak, up to 30 cm long, subglabrate or with scatered, trichomes 0.2-0.3 mm long, appressed to sub-appressed. **Stipules** free, 3–10 × 1–1.3 mm, straight or basally oblique, triangular to triangular-lanceolate. **Leaves** few, at least 3–8 leaves per stem, so the stems obvious and conspicuous, not hidden by foliage, 3.6–6.5 cm long, leaflets 15–19, 2–6.5 × 1–2.9 mm, elliptic, obovate-elliptic, oblong-elliptic, distally rounded or ending in a minute mucro, basally rounded or gradually narrowed, bicolored, light-green and pilose or scattered pilose, the trichomes 2.5–5 mm long, straight, more densely so in young leaves, sometimes the trichomes more densely so along the midvein and edges adaxially, dark-green, glabrous or rarely with very few scattered, straight, white trichomes. **Peduncles** weak, thin, 1.7–7.2 cm long, straight or curved, ascending, pubsecent as the stems; the racemes 0.2–1 cm long, 2–7 flowered, its trichomes 0.2–0.3 mm long, straight, adpressed to sub-adpressed, white and black. **Flowers** blue, turning purple, purple or white with age, at least on the keel tip, up to 8 mm long, ascending and remaining so until open or belatedly semi deflexed but no completely pendulous; the calyx 2.4–3 × 1.5–1.9 mm, the tube 2.2–2.5 mm long, narrow to wide campanulate, inequilaterous, somewhat gibbous dorsally at base, always densely strigulose with black, straight trichomes, very rarely with some few, appreseed to sub-adpressed, white, sparsed trichomes present, the teeth 0.3–0.5 mm long, triangular, sometimes (0.57 mm wide) wider than long, always densely strigulose with black trichomes, thence, the teeth almost with black colored, and strongly contrasting with the less black colored tube; the banner 8.2–8.6 × 4.3–4.5 mm, sessile, elliptic, elliptic-ovate to obovate, apically rounded to truncate-rounded, narrowing gradually to the base, curved; the wings 6.7–7 × 2.5–2.9 mm, the claw 2.9–3.1, the blade 4–4.1 mm long, oblong, oblique and rounded distally; the keel 6–6.5 × 1.3–1.5 mm, the claw 2.9–3 mm long, the blade 3.5–3.6 mm long, half-obovate, incurved, apically rounded but distally triangular-rounded; ovules 6. **Pod** pendulous, stipitate, stipe 2.2–2.5 mm long, persistent on the receptacle, the body 6–7 × 4–4.5 × 0.6–0.8 mm, elliptic, oblong-elliptic to ovate-elliptic, straight, dorsoventrally compressed, basally gradually narrowing, ending in the stipe, gradually acute distally and ending in a short, straight, 0.6–1 mm on beak, tan, ochre, light-bown or turning black with age, apically dehiscent, the valves papery but stiff, glabrous, the septum complete, 0.4–0.5 mm wide; seeds 1.2–1.6 × 1.1–1.2 mm, mitten shapped, olive, orange-olive to brown-reddish, opaque.

Distribution:—Endemic to Mexico, in the municipios of Cuernava and Huitzilac in the state of Morelos (Fig. 24).

Habitat:—Pine forest, tropical rain forest; 2600 m.

Comments: Species related to the perennial *A. guatemalensis* and *A. strigulosus*. *Astragalus sagitticarpus* cand be differentiated from those species by its almost black minute calyx teeth and shorter pod.

Specimens examined:—MORELOS: 10 November 1978, Municipio Huitzilac, Km 74 carretera (antigua) México-Cuernavaca, *O. Téllez 526* (MEXU); 25 October 1981, Km 76 carretera México-Cuernavaca, Mpio. Cuernavaca, *A. Leyva 411* (ENCB); 17 February 2011, Coajomulco, Km 58 carr. México-Cuernavaca, Mpio. Huitzilac, *T. González O. 9* (ENCB).

86. ***Astragalus sanctorum*** Barneby, Brittonia 28: 275. 1976

Type:—MEXICO, Baja California, TYPE: MEXICO. Baja California, SE slope of Banda Peak, Punta Banda, occasional in sage scrub, 250 m, 4 June 1975, *Reid Moran 22395* (holotype: SD 283312!; isotype: 00005840NY!).

Perennial. Stems, up to 55 cm long, erect or incurved or radially scattered minute strigose, the trichomes up to 0.5 mm long, straight, appressed. **Stipules** 2–5.5 mm long, semi-clasping, decurrent, not connate, acuminate to triangular. **Leaves** 6–12.5 cm long, leaflets 17–31, 11–17 mm long, lanceolate, lanceolate-oblong to elliptic, acute or obtuse apically, retuse and mucronate, somewhat bicolored. **Peduncles** 4.5–12 cm long; the racemes 1.5–4 cm long, flowers 9–15. **Flowers** white to whitish, turning ochroleucous when dry, occasionally with purple tones distally in banner and keel; the calyx 5–7.8 × 2.5–3.8 mm, strigose, the tube 3–4.3 mm long, campanulate, basally inequilaterous, the teeth 1.5–3.5 mm long, subulate; the; banner 14.4–17.8 × 6.5–8 mm, rhombic to oblanceolate recurved; the wings 12.3–14.2 × 2–2.6 mm, the claw 5–5.9 mm long, the blade 8.3–9.5 mm long, apically oblique, elliptic to obovate; the keel 9–11.5 × 2.3–3.2 mm, the claw 5–6 mm long, the blade 4.8–5.7 mm long, distally obliquely-obovate. **Pod** 2.3–3.4 × 0.8–1.3 cm, sessile, laceolate-oblong, wide oblong to ovate, inflated like a bladder, basally rounded or slightly narrowed, distally ending in a contracted triangular long beak up to 11 mm long, the valves thin, pale green or lightly purple tinted, papery, ochre with age, sub-diaphanous, septum absent ovules 23–43; seeds 2.4–2.8 mm long, mitten shaped, dark brown, with purple tones, smooth.

Distribution:—Endemic to Mexico, a restricted microendemic of Baja California, recorded only from Punta Banda (31°44'N, 116°43'W), approximately 18 km south of Ensenada, and La Bufadora (31°43'30"N, 116°43'24") (Fig. 24).

Habitat:—Scrublands; adjacent to coastal dunes; cliffs or plains; 40–250 m.

Comments:—In this small area comprising the southern portion of the bay adjacent to Ensenada, several other*Astragalus* species can be associated with this vegetation near to coast including, *A. didymocarpus* var. *didymocarpus*, *A. palmeri, A. pomonensis, A. sanctorum* and *A. trichopodus* var. *lonchus*. Although all of them have widened or inflated bladdery pods, *A. didymocarpus* is easily distinguished by its minute (2–4 mm long), didymous pods, *A. trichopodus* var. *lonchus* is the only one of these remaining species with a stipitate (stipe 5–15 mm long) pod. *Astragalus palmeri* is easily separated by its purple to pink-shiny smaller flowers (banner 7–10.3 mm long, wings 6.7–9.2 mm long) and small (9–23 mm long) pods. *Astragalus pomonensis* and *A. sanctorum* have white petals, but *A. pomonensis* has larger leaflets (larger ones up to 30–37 mm) and more than twice the number of flowers per raceme (average 20–40).

Specimens examined:—BAJA CALIFORNIA: 11 May 1964, South slope of Banda Peak, Punta Bunda, *R. Moran 15929* (ENCB, JEPS, NY, TEX-LL); 9 May 1986, Punta Banda: SE of Peak and W of La Bufadora, *R. F. Thorne 62035, J. Delgadillo* (NY); 4 June 1975, SE slope of Banda Peak, Punta Banda. Alt. 250 m, *R. Moran 22395* (CAS, MEXU, NY); 26 August 1976, Southeast slope of Banda Peak, Punta Banda, *R. Moran 23715* (SD).

87. ***Astragalus sanguineus*** Rydb., N. Amer. Fl. 24(7): 443. 1929

Type:—MEXICO, Coahuila, 40 miles S of Saltillo, Sierra Madre, 1880, *E. Palmer 243*, (holotype: US00001545 digital image!, NY00005842!, P00585160 digital image!, PH00005538 digital image!; isotype NA0095605 digital image!, GH00059436 digital image!, US00930819 digital image!, NY00005841!).

Perennial. **Stems** up to 52 cm long, ascending when young or old plants, frequently prostrate in old plants, strigose, the trichomes short, up to 0.4 mm long, appressed o almost so. **Stipules** 3–14 mm long, free, triangular to lanceolate. **Leaves** 6–28 cm long, leaflets 17–39, 4–28 mm long, elliptic, obovate, to somewhat rhombic, obtuse, mucronate, rarely acute or notched apically, commonly adaxially glabrate. **Peduncles** 5–25 cm long, erect to curved or humistrate by the weight of the mature fruits; the racemes 2–11 cm long, flowers 7–16. **Flowers** red; the calyx 1.1–1.3 × 0.3–0.4 cm, reddish, strigose, the tube 7.5–9 mm long cylindrical, the teeth 3–4.7 mm long, lanceolate; the banner 22–32 × 9–15 mm, almost straight, obovate to oblanceolate to rhombic; the wings 18–31 × 2.5–5 mm, the claw 9.6–12 mm long, narrow oblong to lanceolate; the keel 18–27 × 3.5–5 mm, the claw 8.9–12 mm long, the blade 10.4–14 mm long, oblanceolate, distally somewhat oblique. **Pod** 2–4.5 x 1–2.5 cm, sessile, ascendant or humistrate with age and fruits ripen, elliptic, obong to obovate or subglobose, basally cuneate, distally ending in a contracted conic beak, ventrally carinate, the valves somewhat fleshy to leathery and stiff, minute strigose, wrinkled-reticulate, green to ochre-reddish when young, brown-ochre or with reddish tones with age, septum complete, the pod thence bilocular; ovules 34–52; seeds 2.7–4 mm long, mitten shaped, black.

Distribution:—Endemic to Mexico, northern Mexico, in central (Cuatrociénegas), western (Progreso and Escobedo) and southwestern (Saltillo y Arteaga) Coahuila; central Nuevo León (Santiago and Galeana); southern Tamaulipas (Sierra de La Tapona, 23°20'N–99°40'W) and Durango (highway between Durango and Lerdo City). Abundant in some areas (Fig. 25).

Habitat:—In mountain and high plateaus; calcareous, clayey and gypsum soils; roadside; scrubland; grazed pastures; pine forest; creosote bush scrubland; oak-pine forests; pine-douglas fir forest; streams with abundant weeds; associations of oak, maple, cypress, juniper; chaparral and oak forests with maguey, sotol, mahogany; wet oak forest; wlanut-oak forest; oak forest; disturbed areas; roadside; 1750–2520 m.

Comments:—The other two species with red flowers are *A. helleri* (Veracruz), and *A. coccineus* (Peninsula of Baja California).

Specimens examined:—COAHUILA: 11 September 1991, Rancho La Cruz, aprox. 25 km por la brecha Ocampo-Sierra Mojada, entrando por el Rancho San Pedro, *M. A. Carranza C-1192, L. García S.* (CIIDIR); 27 May 1980, Ejido El Puerto, Aprox. 6 km de Los Lirios, Mpiop. Arteaga, *J. A. Villarreal 105, R. L. Aguillón* (CIIDIR); 22 March 1980, 1 km al E de San José de los Nuncios, Mpio. Ramos Arizpe, *J. Valdés, s.n.* (ANSM); 5 August 1975, Valle de los Ángeles, Sierra de La Paila, Mpio. Ramos Arizpe, *J. Passini 4687, M. F. Robert* (ANSM, ENCB); 20 October 1987, Sierra La Concordia, 6 km al NE de La Victoria, *J. A. Villarreal 4103, M. A. Carranza, A. Rodríguez* (ANSM); 27 July

1977, Mpio. Cuatro Ciénegas, Cañón del Desiderio, 0.1 miles down E from junction of E and W forks ans ca. 0..2 miles up form lower jacal 9 miles by road W from Rancho Cerro de la Madera, *J. Valdéz R. 1083, T. Wendt* (ANSM); 28 October 2007, Sierra de Zapalinamé, al suroeste de la Ciudad de Saltillo, *S. G. Gómez, 528, M. A. Hernández, J. Robledo* (ANSM, IBUG, IEB, MEXU); 21 March 2005, Camino del Cuatro, exposición noroeste de la sierra, *J. A. Encina 1398, F. J. Encina, J. M. Guillermo* (ANSM, MEXU); 2 May 1977, ca 28 (air) miles WSW of Cuatro Cienegas, in limestone Canon los Pozos, ca 5 (rd) miles W of Rancho Cerro de la Madera towards Cañon, *J. Henrickson 15990, E. Lee* (ANSM, IEB, MEXU); 26 July 2003, Sierra de Zapalinamé, Camino del Cuatro, exposición norte de la Sierra, *J. A. Encina 1150, S. Marines, R. Pineda* (ANSM, IBUG); 28 September 2001, Sierra de Zapalinamé, Cañón de Boca Negra, *J. A. Encina 937, S. D. Cruz, E. López V.* (ANSM); 26 August 2000, Sierra de Zapalinamé, Cañón El León, al NW del Ejido El Diamante, *J. A. Encina 607, I. Portes* (ANSM); 2 June 2000, Sierra de Arteaga, el Edán, 5 km al E de San Juan de los Dolores, *J. A. Villarreal 9002, M. A. Carranza, I. Ramírez* (ANSM, ENCB, MEXU); 22 March 1980, Los Gallineros, 2 km al S de Ramos Aizpe, Carretera Monterrey-Saltillo, Mpio. Ramos Arizpe, *J. Valdés R. s.n.* (ANSM); 1 April 2015, al E de la Sierra Zapalinamé, 650 m al NE del Ejido Sierra Hermosa, *J. A. Encina 4405, J. M. Cárdens, L. West P.* (ANSM); 28 July 1982, Rancho Los Ángeles, 54 km al S de Saltillo, *J. A. Villarreal 1629, S. Villaseñor, M. A. Carranza* (ANSM); 23 June 1976, Canon de la Hacienda, Sierra de la Madera, NW of Cuatro Cienagas, *D. J. Pinkava P13646, McGill, Reeves, Nash* (NY); 6 September 1939, Cuatrocienegas. Sierra de la Madera, *C. H. Muller 3180* (NY, TEX-LL); 15 March 1983, Sierra de la Madera: upper Cañada Desiderio (10 km W Cerro de la Madera), *S. A. Thompson 524, J. E. Rawlins, A. Zimmerman* (NY); 2/3 August 1973, Cañon de la Gavia above (S. of) Rancho de la Gavia, *M. C. Johnston 12038C, T. L. Wendt, F. Chiang, R. Riskind* (NY); 25 July 1880/1 August 1880, Canyon and elevated portion of Sierra Madre, 12–14 leagues S of Saltillo, *E. Palmer 243* (NY); 8 August 1976, 75 (air) miles S of Big Bend National Park basin, S central portion of Valle de Pinos (Vacas) of the Sierra Santa Fe del Pino, *J. Henrickson 15119, B. Prigge* (IEB, MEXU); 27 July 1995, Los Lirios—El Cercado. *Hinton et al. 25435* (IEB, MEXU, TEX-LL); 10 August 1976, 29 (air) miles WNW of Cuatro CiEnegas on the N slope of the Sierra de la Madera, 7.8 (rd) miles W of Rancho Cerro de la Madera, on trail to Cañon Desiderio, *J. Hernickson 15249, B. Prigge* (MEXU); 3 May 2004, Coahuila, *J. Henrickson 23519, B. VanDen Heuvel* (MEXU); 15 August 1975, Sierra Santa Fe del Pino, Mpio. Villa Ocampo, *J. Passini 5029, M. F. Robert* (ENCB); 15 August 1975, Sierra Santa Fe del Pino, Mpio. Villa Ocampo, *J. Passini 5929, M. F. Robert* (ENCB); 23 March 1961, 5 km al N de Valle de los Ángeles, *H. Mendiola s.n.* (ENCB); 14 March 1977, Cañon Desiderío (N-draining): mid-canyon, 0.1 mi. down (E) from jct. f E & Wforks, and 0.2 mi. up from lower jacal; 9.0 mi by road W from Rancho Cerro de la Madera, *T. Wendt 1913, E. Lot, R. G. Olmstead* (ENCB); 9 March 1983, Sierra La Martha, Camino a Cola de Caballo, Mpio. Santiago, *Villarreal s.n.* (CIIDIR). **DURANGO:** 3 April 1976, Km 85 Carretera Durango-Lerdo, *J. A. Acosta G., s.n.* (ANSM, MEXU); 10 August 1976, *J.S. Henrickson, B. Prigge* (TEX-LL). **NUEVO LEÓN:** 12 April 2003, *E. Estrada 15483, C. Yen* (ANSM, MEXU); 12 June 1985, Pablillo, Galeana, NL, *J. A. Villarreal 30131, J. Elizondo, L. Arce* (ANSM); 24 March 1985, El Carrizo, Galeana, N.L, *G. B. Hinton 18799* (CIIDIR, ENCB, IBUG, IEB, MEXU); 9 March 1983, *J. A. Villarreal s.n., M. A. Carranza, A. Orta* (CIIDIR); 20 June 1972, *F. Chiang, T. Wendt, M. C. Johnston 8064* (MEXU, NY); 21 June 1987, Camino "Cola de Caballo" at "Manzano", *E. Estrada 1286* (MEXU, NY); 3 April 1969, Rio Santa Rosa, *I. González Q. 3880* (CAS, ENCB, IEB, MEXU); 27 February1991, Ladera E del Cerro Potosí, *E. Pérez C. 2086, S. Zamudio* (IEB, MEXU); 20 March 1992, Enrramadas, nr. Galeana, N. L, *Hinton et al. 21857* (IEB, MEXU); 16 March 1976, *M. D. Whalen 322* (IEB); 16 March 1981, Ca. 26 mi E of jame at ca. Base of S. La Viga B. L. & Gayle Turner *B, L. Turner 15028, G. Turner* (MEXU). **TAMAULIPAS:** 15 April 1986, Sierra La Concordia, 6 km al NE La Victoria, *L. Hernández 1770* (ANSM); 16 June 1984, Sierra de la Tapona entronque carn. Cd. Victoria, *J. Valdéz 115, M. A. Carranza* (ANSM, CIIDIR, ENCB, MEXU); 16 April 1976, 15 km al N de La Perdida, rumbo a Valle Hermoso, *F. González M. 8665, P. Hiriart, E. Guevara, G. Ramos, A. Castellanos, P. Zavaleta* (ENCB, MEXU); 16 June 1984, Sierra de la Tapona entronque carn. Cd. Victoria, *R. V. Reyna 115, M. A. Carranza* (MEXU); 16 April 1984, Sierra de la Tapona, entronque carr. Cd. Victoria, *R. V. Reyna 115, M. A. Carranza* (IEB).

88. ***Astragalus scalaris*** S. Watson, Proc. Amer. Acad. 23: 270.1888

Type:—MEXICO, Chihuahua, by streams in the Sierra Madre, Chihuahua, 23 September 1887, *C. G. Pringle 1220* (holotype: not found; isotype: NY00005845!, NDG26915 digital image!, MIN1000374 digital image!, MEL2074448 digital image!, PH00005701digital image!, AC00319845 digital image!, MEXU01169236!, F0058948F digital image!, NA0026154 digital image!, NY00005843!, US00930817 digital image!, *Phaca scalaris* (S. Watson) Rydb., N. Amer. Fl. 24: 361. 1929.—*Astragalus scalaris* S. Watson var. *quercetinus* M. E. Jones, Rev. N.-Amer. *Astragalus* 107. 1923.

Perennial. Stems up to 55 cm long, commonly with single stem at base, when so, erect or branched near base or at half, sometimes several ones from base, striate, minute, the trichomes short, up to 0.4 mm long, straight to appressed. **Stipules** 1.5–5 mm long, triangular to lancoelate, semi-clasping, not connate, decurrent. **Leaves** 1.5–13 cm long, leaflets 11–31, 1.2–13 mm long, frequently with the pairs, distant from each other, linear, linear-elliptic, elliptic to ovate, notched apically, occasionally obtuse and mucronate, adaxially glabrate. **Peduncles** 2.4–11 cm long, erect to incurved; the racemes 3–21 cm long, lax, flowers 15–50, rarely less. **Flowers** pink-purple, whitish, sometimes with purple tones apically, turning pale to ochroleucous when drying; the calyx 2.2–2.9 × 1.7–2 mm, strigose, trichomes black, the tube short, 1.6–2 mm long, campanulate to somewhat almost hemispheric, basally inequilaterous to oblique, the teeth 0.5–1 mm long, triangular, one pair wider and shorter than the rest; the banner 5–6.4 × 3.6–4.8 mm, recurved, ovate, slightly notched apically; the wings 4.8–5.5 × 1.4–2.3 mm, the claw 1.6–1.9 mm long, the blade 3.6–4.4 mm long, oblong to oblanceolate, straight or almost so; the keel 3.7–4.7 × 1.7–2.1 mm, the claw 1.5–1.9 mm long, the blade 2.6–3 mm long, triangular to obovate, dorsally oblique. **Pod** 4–8 × 2.5–3.5 mm, deflexed or horizontal, stipitate (stipe 0.4–1.3 mm long), triquetrous, sometimes barely inflated-trigonous, oblique, obovoid, basally rounded or wide narrowed, distally abruptly contracted in a incurved short beak, ventrally straight carinate or slightly convex, dorsally shallowly and openly sulcate, the valves green, thin, papery and ochre with age, reticulate, septum absent, when present tiny but incomplete; ovules 4–9; seeds 2–2.5 mm long, mitten shaped, brown, smooth.

Distribution:—Endemic to Mexico, exclusively in Chihuahua, mountains of the western portion (Madera, Gómez Farías, and Guerrero municipalities), low hills in the central region (Chihuahua) and mountains in the southern part (San Francisco del Oro and Parral) (Fig. 25).

Habitat:—Streams; areas with disturbance; oak-pine forest; pine forest; oak forest; 1950–2400 m.

Comments:—The range of *A. scalaris* includes another 13 species of *Astragalus* inhabiting the same ecosystems, but the morphological peculiarities of this species make it easily distinguishable from the rest, since it is the only species with small, widened, oblique to obovoid, triquetrous or inflated-trigonous, stipitate pods (4–8 mm long), peduncles 2–3 times longer than leaves, and lax racemes with abundant flowers that are well spearated from each other.

Specimens examined:—CHIHUAHUA: 23 September 1887, Por arroyos de la Sierra Madre, *C. G. Pringle 1220* (MEXU, NY);16 September 1899, Chihuahua Recogido en la Sierra Madres cerca de Chhichupa, *C. H. T. Townsend 443, C. M. McBaber* (NY, US); 30 September 1883, Sierra Madre *C. G. Pringle 1587* (NY); 30 September 1888, Sierra Madre, *C. G. Pringle 1587* (NY); 3 September 1994, Gómez Farías. Laguna de Babícora, *E. Estrada 2929, T. Lebge, G. Quintana* (NY); 16 September 1899, Chihuahua Recogido en la Sierra Madres cerca de Chhichupa, *C. H. T. Townsend 443, C. M. Barber* (MEXU, NY); 16–17 September 1934, Barranca Colorad", Sierra Gazachic 35, *F. W. Pennel 18933* (NY, US); 16 September 1903, San Diego Canyon*, M. E Jones s.n.* (CAS, NY); 16 September 1899, Chihuahua Recogido en la Sierra Madres cerca de Chhichupa, *C. H. Townsend, 433, M. Barber* (MEXU).

89. ***Astragalus scutaneus*** Barneby, Amer. Midl. Naturalist 55: 502. 1956

Type:—MEXICO, Jalisco, sandy shore at west end of Lake Chapala, 14 July 1940, *C. L. Hitchcock & L. R. Stanford 7166* (holotype: WS Not seen: isotype: RSA0003102 digital image!, OSC0001444 digital image!, RSA0003101 digital image!, GH00059440 digital image!, RM0002459 digital image!, UC710966 digital image!, CAS0000801 digital image!).

Annual. Stems up to 45 cm long, commonly single from base, somewhat strong, striate, occasionally with purple tones, minute strigose, trichomes up to 0.5 mm long, straight, appressed. **Stipules** 2.5–4 mm long, semi-clasping or free, not connate, triangular, the upper ones mostly free. **Leaves** 5–9 cm long, leaflets 15–23, 5–15 mm long, linear, oblong, lanceolate to obovate, truncate or distally retuse, adaxially glabrate o scattered pubescent. **Peduncles** 2.5–6.5 cm long, ascending, straight or almost so; the racemes 1.2–6.5 cm long, dense, flowers 16–40. **Flowers** blue-purple, lilac, purple veined; the calyx 2–3.5 × 1.7–2 mm, densely strigose, trichomes black or black with few white ones mixed, the tube 1–1.5 mm long, campanulate, basally inequilateral (therefore, the hole, oblique to subgibous, with purple tones, the teeth 1.1–1.5 mm long, subulate to triangular; the banner 5.2–6 × 3.7–4 mm, obovate-flabellate, basally narrowed, distally retuse; the wings 5.2–5.5 × 1.5–2 mm, the claw 1.6–2 mm long, the blade 4–4.2 mm long, triangular, oblong, oblique distally; the keel 3.9–4.4 × 1.6–1.8 mm, the claw 1.7–2.1 mm long, the blade 2.3–2.9 mm long, diatally oblique, obovate or almost circular. **Pod** 5–9.8 ×| 6–7.8 mm, sessile, broadly elliptic, or almos circular, deflexed, dorsoventrally compressed contrary to the septum, simulating a "car windshield" or strongly arched flattened, slightly retuse, distally abruptly apiculate, 0.8–1.5 mm thick, the valves, thin, green, scattered strigose, turning papery, green-ochre, sometimes with purple tones, dark-brown or dark-purple, diaphanous, reticulate; septum incomplete; ovules 10–12; seeds 1.8–2.1 mm long, mitten shape, green-olive or brown, sometimes with purple tones, opaque.

Distribution:—Endemic to Mexico, southern and southwestern Mexico; in Guanajuato and Jalisco, also in the northern region, in southwetern San Luis Potosí (Salinas Municipallity) bordering Aguascalientes and Zacatecas (Fig. 25).

Habitat:—Lakeshores; playas with saline soils; croplands; subtropical scrublands; *Acacia* scrublands; halophilous; temporary ponds; mezquite scrublands; sulphur springs; flood areas; brackish soils.

Comments:—Species distinctive by its almost planar, laterally compressed, curved or arched, strigose pods and racemes that are 20–40 flowered. Another species with a similar pod shape is *A. brazoensis* (Tamaulipas and Coahuila), although the latter has racemes with fewer flowers, 7–25, the pod glabrous, and elevated on a small gynophore (1.5 mm long or shorter).

Specimens examined:—GUANAJUATO: 22 October 1995, 2 km al S de Caleras, de Obrajuelo, Mpio. Apasco El Grande, *Rzedowski 52955* (IEB); 9 July 2002, 2 km al NW de Cupareo, Mpio. Salvatierra, *Rzedowski 53958* (IEB); 17 October 2001, 2 km al S de Calera de Obrejuelo, Mpio. Apasco El Grande, *Rzedowski 53838* (ENCB, IEB, MEXU). **JALISCO:** 19 August 1902, Constancia Sta, near Guadalajara, *C. G. Pringle 11362* (US); 18 May 1969, Norte de Zacolaco, Mpil. Zacoalco de Torres, *J. L. Íñiguez D. 1350* (IBUG); 11 May 2000, a 1 km del abrevadero Jal. Mpio de La Boca, *J. L. Álvarez s.n.* (IBUG); 12 April 1983, Libramiento Chapala-Jocotepec, a orillas del Lago, Mpio. Chapala, *J. Cervantes R. 27* (IBUG); 13 June 1983, Ribera Norte del Lago de Chapala, Mpio. Jamay, *Estrada Faudón s.n.* (IBUG); 18 May 1969, Norte de Zocoalco, *L. Ma. Villarreal de Puga 3049* (ENCB, IBUG, IEB), 18 May 196?, N de Zacolaco, *L. M. Villarreal de Puga 3072* (IBUG); 5 July 1987, 500 m all W de Los Pozoz, Mpio. Acatlán de Juárez, *J. A. Machuca 5933* (IEB). **SAN LUIS POTOSÍ:** ¿-¿-1989, Las Terrazas del Cono, Ejido Nuevo Centro de Población La ¨paz, , Mpio. Salinas, *A. Gómez G. s.n.* (ENCB)

90. ***Astragalus sinaloae*** Barneby, Mem. New York Bot. Gard. 13(1): 450. 1964

Type:—MEXICO, Sinaloa, Ocurahui, Sierra Surotato, 1–10 September 1941, *H. S. Gentry 6283* (holotype: MICH1107124 digital image; isotype: GH00059441 digital image!, ARIZ-BOT-0004003 digital image, NY00005850!).

Perennial. Stems up to 47 cm long, decumbent, minute strigose, trichomes very short, up to 0.2 mm long. **Stipules** 1.2–2.7 mm long, semi-clasping, or the upper ones somewhat free, triangular to lanceolate, not connate. **Leaves** 2–5.5 cm long, leaflets 13–17, 3–9 mm long, oblong, elliptic or obovate, distally entire or notched, adaxially glabrate. **Peduncles** 2–9 cm long; the racemes 2–5 cm long, commonly dense, flowers 15–33. **Flowers** whitish, turning yellowish when drying; the calyx 2.6–2.7 × 1.8–2 mm, minute pubescent, the tube 1.8–2.1 mm long, the teeth 0.7–0.8 mm long, triangular to subulate; the banner 5.2–5.3 × 3.3 mm, obovate, recurved, distally shallowly retuse; the wings 4.9–5.2 × 1.4 mm, the claw 2.1–2.2 mm long, the blade 2.8–3.6 mm long, oblong to obovate, distally oblique; the keel 5.1–5.3 × 1.9 mm, the claw 2.1–2.3 mm long, the blade 3–3.3 mm long, almost elliptic, distally oblique. **Pod** 11–15 × 2–2.5 mm, deflexed, shortly stipitate (stipe 0.5–0.9 mm long), triquetrous, linear, narrowed in both ends, ventrally compressed and carinated, dorsally sulcate, lateral faces straight, the angles narrows and obtuse, the valves strigose, the trichomes white, very rarely some black scattered ones mixed, papery, ochre, reticulate, septum complete, the pod thence bilocular; ovules 10–12; seeds mitten shaped, brown, light-brown, somewhat opaque.

Distribution:—Northwestern Mexico, at three separated localities; southern Sonora (Álamos); central (Badiraguato) and southern (Concordia) Sinaloa. Note that these last two localities are in close proximity to southwestern Chihuahua and southwestern Durango respectively (Fig. 25).

Habitat:—Volcanic, reddish and clayey soils; humid or sub-humid ravines; associated with conifer forests; oak-pine forest; associated with with madrone; cloud forest; areas with walnut and pecan; 1400–2160 m.

Comments:—The mountainous areas where *A. sinaloae* is distributed is home to at least eight other species of *Astragalus*. Of these species, only *A. sinaloae* and *A. ervoides* possess whitish or yellowish (banner or their veins sometimes slightly with lilac tones and the apex of the keel purple) petals and stipitate triquetrous pods and. *A. ervoides* can be differentiated due to the ovary and pod being glabrate, whereas in *A. sinaloae* both are pubescent.

Specimens examined:—DURANGO: 2 September 1997, Sierra Madre Occidental: Los Mangles Cañon, 7.5 km N ("E") of the Sinaloa line along Hwy 40 (Mazatlan-Durango Hwy) ca. 1.2 km S of Revolcaderos, *A. C. Sanders 21244, F. M. Roberts, P. Mackay, T. Tomas, M. Egger, S. Eliason* (NY); 27 September 1973, Along Mexico Highway 40, about 97 miles east of Mazatlan and 105 miles west of Durango, along El Espinazo del Diablo, 4.1 miles west of Las Blancos and 20.2 miles east of El Palmito, 15.1 miles west of La Ciudad, Sierra Madre Occidental, *J. L. Reveal 3574* (MEXU, NY); 17 August 1970, 56 miles SW of El Salto, *C. D. Johnson 110-70* (MEXU, NY). **SINALOA:** 12

August 1974, Steep slopes of Barranca 3 km NE of El Palmito, *D. E. Breedlove 36461* (MEXU, NY); 1 October 1971, 5.5 mi. O de El Palmito a unos 50 m. en el lado cuesta abajo de la autopista 40, donde se extiende un camino de tierra en una pequeña cresta, *R. Spellenberg 2719* (NY, ENCB), aproximadamente ¼ mi. O de El Palmito a lo largo de la antigua carretera de registro detrás de la estación de bomberos de Rancho Liebre, *R. Spellenberg 2722* (ENCB, NY), proximadamente ¼ mi. O de El Palmito a lo largo de la antigua carretera de registro detrás de la estación de bomberos de Rancho Liebre, *R. Spellenberg 2723* (ENCB, NY) *D. Jackson, D. Martin* (NY); 2 October 1970, 3 miles N of Los Ornos along road to Ocurahui, *D. E. Breedlove 18330* (NY); 1 September 1941/10 September 1941, Ocurahui, Sierra Surotato. Alt. 6000–7000 ft, *H. S. Gentry 6283* (NY); 11 September 1979, Concordia along Mexican Highway 40, 6–8 km SE of El Palmito *D. E. Breedlove 43852* (MEXU). **SONORA:** 20 August 1994, Sierra de Alamos, ca. 5 km SW of Alamos along the trail from La Huerta to Cerro Aduana, *V. W. Steinmann 94-79, M. Fishbein, A. Martin* (MEXU, NY).

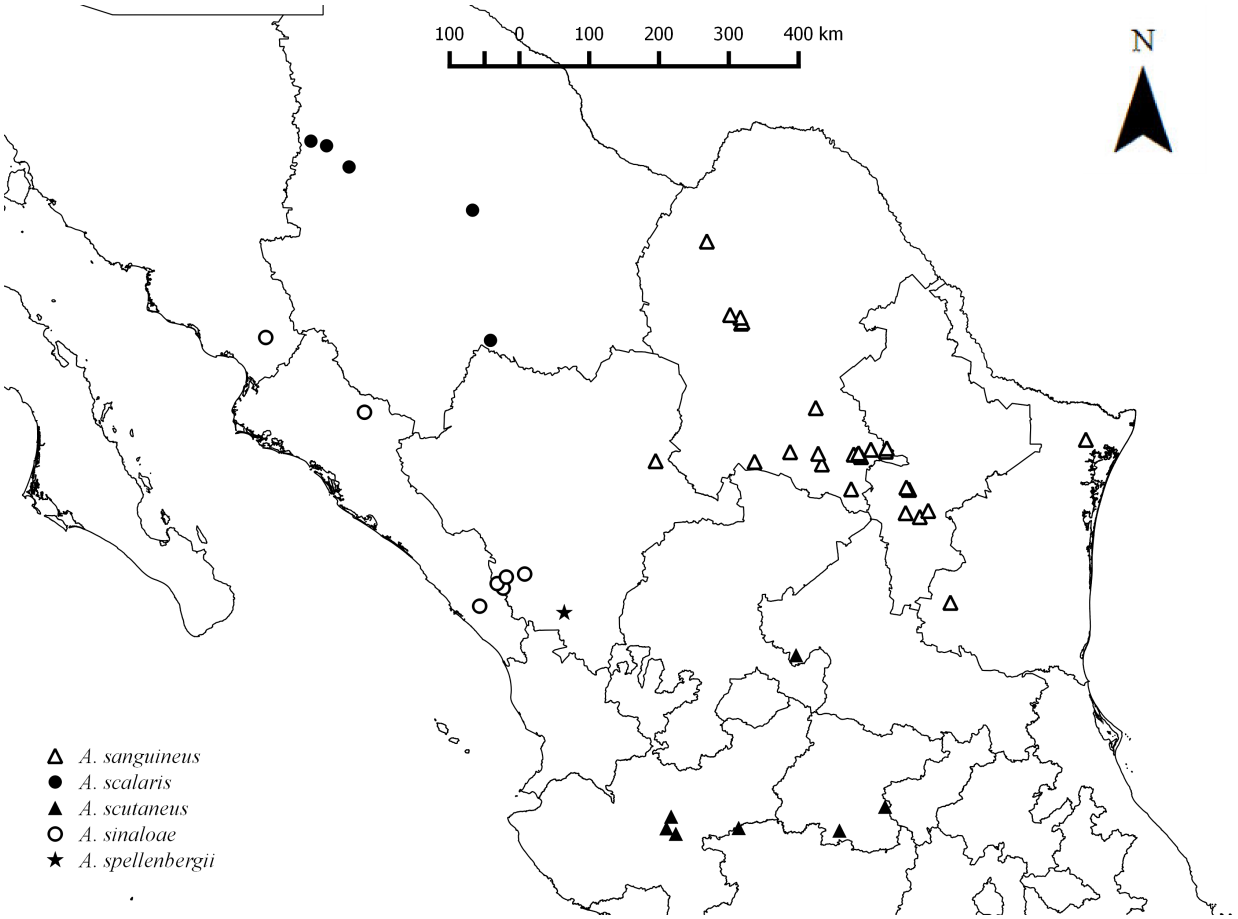

FIGURE 25. Map showing the distribution of *Astragalus sanguineus, A. scalaris, A. scutaneus, A. sinaloae,* and *A. spellenbergii* in Mexico.

91. ***Astragalus spellenbergii*** A. E. Estrada, S. González & Villarreal, Phytotaxa 288(1): 92. 2016

Type:—MEXICO, Durango, Municipio de Pueblo Nuevo, Maíz Gordo, ladera, alt. 3043 m, 23 October 2010, *C. Vázquez R. 40a & N. B. Cabada A.* (holotype CIIDIR!; isotype CFNL!).

Perennial. **Stems** short, up to 15 cm long, branched from base, decumbent to suberect, pilose to hispid, trichomes up to 1 mm long, extended or retrorsely extended, straight or slightly sinuosos, white. **Stipules** dimorphic, the lowest ones 2–2.6 mm long, connate-clasping, in nodes without leaves, apically free, the middle and upper ones 3–8 mm long, semi-clasping or free, ovate to triangular, apically abruptly acute. **Leaves** 1.1–5.5 cm long, leaflets 5–15, 3–9 x 1–5 mm, elliptic to oblong, apically rounded, pilose to hispidulous in both surfaces, abaxially denser. **Peduncles** 3.5–7 cm long, erect or ascendant, trichomes black and white mixed; the racemes 2–3 cm long, dense, compact, flowers 9–15, deflexed. **Flowers** yellow to ochroleucous; the calyx 4.3–4.7 × 1.4–1.7 mm wide, the tube 1.3–1.7 mm long,

campanulate, inequilaterous o slightly oblique, pilose-hispidulose with black trichomes, rarely some white one present, the teeth 1.7–3 mm long, triangular; the banner 6.5–7.2 × 2.8–3 mm, elliptic, obovate to rhombic, distally obtuse to retuse, recurved; the wings 5.2–5.3 × 1.3–1.8 mm, the claw 2.2–2.3 mm long, the blade 2.9–3.1 mm long, oblong, distally oblique, apex rounded; the keel 4–4.2 × 1.6–1.8 mm, the claw 2 mm long, the blade 2–2.2 mm long, semi-obovate, distally oblique and rounded; **Pod** deflexed, short stipitate (stipe 0.2–0.3 mm long), 7–8 × 2–3 mm, oblong, triquetrous, straight o slightly incurved, dorsally sulcate, ventrally concave keeled, basally rounded or slightly obtuse, distally ending in a short, acute, triangular beak, the valves green to yellowish, turning stramineous to dark-brown with age, densely hirsute to hispidulous, trichomes black, black or white and black and white mixed along ventral suture and white trichomes in the rest of the body, turning subglabrate or scattered hispid with age, imperceptibly reticulate, septum complete, the pod thence bilocular; ovules 6–7; seeds 2–2.2 mm long, mitten shaped.

Distribution:—Endemic to Mexico; currently, *A. spellenbergii* in known only from the type locality at Pueblo Nuevo, Durango (Fig. 25).

Habitat:—Associated with oak-pine forest, and alpine meadows; 2800–3650 m.

Comments:—This species is morphologically similar to *A. purpusii* and *A. micranthus*, both with purple flowers. Although in *A. micranthus* the flowers become yellowish when drying, and *A. spellenbergii* can be distinguished by its retrorse, divergent and longer pubescence, as well as its shorter leaves, with less and shorter leaflets, shorter peduncles, fewer flowers per cluster, banner longer but narrower and its larger seeds. Occurs in high elevations of mountains, similar to *A. purpusii* (northeastern Mexico) and *A. micranthus* (central and southern Mexico).

Specimens examined:—DURANGO: 23 October 2010, Maíz Gordo, Mpio. Puebo Nuevo, *C. Vázquez R. 40a, N. B. Cabada A.* (CIIDIR; CFNL).

92. *Astragalus strigulosus* Kunth, Nov. Gen. Sp. 6. 494

Type:—MEXICO, Hidalgo, Crescit in temperatis Regni Mexicani, prope Moran (Morán or Real de Morán, between Pachuca and Actopán), alt. 1330 hex, 1803, *A. von Humboldt & A. Bonpland s.n.* (holotype: P00659958 digital image!).

Tragacantha strigulosa (Kunth) Kuntze, Revis. Gen. Pl. 2: 948. 1891.—*Atelophragma strigulosum* (Kunth) Rydb., Bull. Torrey Bot. Club 55: 158. 1928.

Perennial. Stems up to 90 cm long, almost always erect when young or ascending to slightly decumbent with age, hard, strigose to pilose, subglabrous or pubescent, trichomes up to 0.7 mm long, sub-apressed, stiff. **Stipules** 2.5–9 mm long, the lowest ones connate up to the half of its length, the rest basally connate or clasping but distally free. **Leaves** 4–10 cm long, leaflets 13–29, 6–22 mm long, oblong, oblong-elliptic to elliptic, distally obtuse or notched and mucronate, rarely acute, adaxially glabrate or pubescent on margins. **Peduncles** 4–10 cm long; the racemes 1.5–9.3 cm long, dense when young, flowers 12–40, deflexed. **Flowers** white, light-yellow to ochroleucous; the calyx 5–7.5 × 2.2–2.8 mm, pilose, trichomes black or black and white mixed, the tube 2.6–3.2 mm long, campanulate, the teeth 2.5–4.3 mm long, lanceolate to subulate, one pair shorter than the rest; the banner 9–11.5 × 4.2–6 mm, obovate, rhombic to oblanceolate, slightly to deeply notched; the wings 7.4–10.5 × 1.8–2.5 mm, the claw 3–3.5 mm long, the blade 5.5–7.5 mm long, oblanceolate, distally oblique, incurved; the keel 6.7–7.5 × 2.1–2.6 mm, the claw 3–3.5 mm long, the blade 4.2–4.8 mm long, dorsally distally oblique, almost obovate, incurved. **Pod** 12–20 × 4–7 mm, deflexed, stipitate (stipe 2–4 mm long), widened, dorsoventrally compressed, elliptic to oblong, almost always straight, sometimes recurved, wide cuneate in both ends, distally short apiculate, ventrally carinate, dorsally wide sulcate, the valves fleshy, turning papery-stiff, green, glabrate, ochre or even black with age, reticulate, trichomes almost always black, rarely white ones present, septum complete, the pod thence bilocular or almost so, opening dorsaly but only in the base; ovules 14–19; seeds 1.8–2.3 mm long, mitten shape, brown to green-olive, opaque, smooth.

Distribution:—From southern Durango, through San Luis Potosí, Jalisco, Hidalgo, Jalisco, Michoacán, Morelos, Puebla, through State of Mexico, Tlaxcala, and Oaxaca (Fig. 26).

Habitat:—Eroded ravines; canyons, reddish stony, volcanic and andesitic soils; scrub and grassland on hillsides; sclerophyllous, xerophilous and subtropical scrub with; oak forest; disturbed juniper forest; pine-juniper, pine-oak forest; areas with disturbance; disturbed areas; crop fields; grasslands in flat areas; 1860–3025 m.

Comments:—Whitin the area of distribution of this species, nine other species of *Astragalus* with stipitate oblong, elliptic, ellipsoid, somewhat widened, never inflated like bladder or triquetrous pods can be found. Of these, only four species, *A. guatemalensis, A. jaliscensis, A. radicans*, and *A. zacatecanus* have mainly white to ochroleucous flowers (rarely pale pink or bluish in *A. guatemalensis*). *Astragalus radicans* is distinguished by its rooting stems, *A.*

zacatecanus by its short flowers and its banners up to 9 mm long. The remaining three species, *A. guatemalensis*, *A. jaliscensis,* and *A. strigulosus* constitute a complex of species almost identical morphologically, their differences are extremely subtle. In general terms, the morphological characters are extremely variable in all three of these species, in this sense, almost all of plants have overlapping measures in the characters, making it difficult to use a single character to differentiate them. Perhaps the most obvious characters separating *A. guatemalensis* from the others is its pubescent ovary and the pod opening totally along its dorsal suture. The length (20–38 mm) and the width (6–7 mm), and the proportion (4–5 times longer than wide) of the measurements of the *Atragalus jaliscensis* pod, is perhaps the only other characteristic to differentiate it from *A. strigulosus* (proportion 2–3 longer than wide).

Specimens examined:—DURANGO: 22 June 1975, Collected 20.5 miles east of El Salto, *D. G. LeDoux 1916, Dunn* (ENCB, NY, TEX-LL); 3 September 2003, Área NAtural Protegida: Sierra de Guadalupe. Dlegación Gustavo A. Madero, México, D.F, *J. E. Rivera 3363* (MEXU). **HIDALGO:** 20 September 1906, Calcareous mesas, Metepec Station, 2438 m, *C. G. Pringle 10311* (ENCB, MEXU); 26 August 1963, San Gregorio, *Rzedowski 16964* (ENCB, MEXU); 13 August 1990, San Agustín Tlaxiaca—Camino de terracería Benito Juárez-Chapultepec de pozos, aprox. 1 km antes de llegar a la desviación a "La Virgen" sierra del monte alto de Temoaya, ejido Puerto México. *I. Díaz V. 830* (MEXU); 7 September 1963, *L. González s.n.* (MEXU); 28 July 1956, 0 miles south of Actopan, growing in waste area between Agave fields ,2134 m, *J. Thompson 84, O. S. Fearing* (ANSM, TEX-LL; 22 June 1904, Metepec Station (Hidalgo), *C. G. Pringle 13263* (CAS); 20 September 1906, Calcareous mesas, Metepec Station, 2438 m, *C. G. Pringle 10311* (CAS, MEXU, NY, US); 3 October 1971, 1 km al SE de Tepeapulco, *F. Jiménez S. 197* (CAS, ENCB, TEX-LL); 1 July 1978, Epazoyucan—0.5 km al NE de Nopalillo, *M. Medina C. 2148* (CAS, ENCB, IEB, MEXU); 4 October 1974, 1 km al NW de Tolcayuca, Mpiop. Tolcayuca, *J. D. Flores L. 124* (CAS, ENCB, MEXU); 5 September 1980, Rancho Mazatepec, 1 km al N de Santo Tomás, al S de Singuilucan, Mpio. Zempoala, *R. H. Hernández Magaña 4894* (CAS, ENCB, MEXU); 22 July 1905, Near Tulancingo, State of Hidalgo , *J. N. Rose 8835, J. H. Painter, J. S. Rose* (NY); 1 July 1966, Hidalgo , Cerro de San Isidro (between Haciendas San Isidro and Tetlapayac) along road, 9 km. ESE. of APAM, *R. C. West J-6* (NY); 19 June 1966, 10 km. NE of APAN (NE-SE slopes), *R. C. West B-26* (NY); 24 June 1966, 2 km NE of APAM. S. slope *R. C. West D-4* (ENCB, NY); 24 October 1991, Ajacuba—Aprox. 1.5 km despuès del poblado Emiliano Zapata, rumbo a Ajacuba (de E a W), ej. Tecomatlàn *I. Díaz V. 965* (IEB, MEXU); 14 September 1975, 4 km al NE de Pachuca, sobre la carretera a Real del Monte, *Rzedowski 33560* (ENCB, IEB); 20 September 1906, Metepec Station, *C. G. Pringle 10311* (MEXU); 24 August 1972, Epazoyucan—Nopalillo *Rzedowski 29224* (MEXU); 25 June 1981, Zempoala—Sierra de los Pitos *G. Benítez 824* (MEXU); 30 August 1979, km 40.5 de la carretera Cd. Sahagún-Pachuca. Cultivos de cebada y maíz, *F. J. Espinosa G. 702* (MEXU); 10 August 1981, 6 km NW de Apan, Mpio. Apan, *R. Hernández M. 6311* (ENCB); 29 August 1965, Cerro Ventoso, entre Pachuca y Real del Monte, *Rzedowski 20598* (ENCB); 24 August 1972, Epazoyucan—Nopalillo *Rzedowski 29244* (ENCB); 31 August 1980, 2 km al N de Huxmi, Mpio. Tlaxiaca, *Rzedowski 36962* (ENCB); 7 September 1963, El Ocote, Mpio. Epazoyuca, *R. Cruz C. 1029* (ENCB); 22 June 1969, Pachuquilla, *H. Puig 4795* (ENCB); 25 June 1968, 6 km al NE de Tepeapulco, faldas del Cerro Xihuingo, *D. García S. 2642* (ENCB); 15 October 1978, 6 km al N de Tlanalapan, Mpio. Tlalnalapan, *I. Piña s.n.* (ENCB); 17 August 1975, 5 km al NNE de San Juan Tizahuapan, Mpio. Epazoyucan, *M. Medina C. 686a* (ENCB); 6 July 1975, Ranchería Buenavista, 8 km al E de San Marcos, Mpio. Otumba, *C. Fuentes M. AIII-43* (ENCB); 26 November 1970, Entre Pachuca y Real del Monte, *J. Espinosa 949* (ENCB). **JALISCO:** 18/21 November 1953, Sierra de Cuale, southwest of Talpa de Allende; southwest of the prominent peak called Piedra Rajada; pine forests near summits, on steep south- and west- facing slopes, 1800–2250 m, *R. McVaugh 14382, J. Sooby* (US); 12 October 1952, Northeastern slopes of the Nevado de Colima, below Canoa de Leoncito; steep mountainsides in pine- oak forest , 2250–2550 m, *R. McVaugh 13457* (MEXU, US); 13 July 1972, Concepción de Buenos Aires, Sierra del Tigre, *L. M. Villarreal P. 3977* (IEB); 24 August 1972, Nopalillo, Mpio. Epazoycuan, *Rzedowski 29944* (ENCB). **MEXICO CITY:** 14 September 2005, La Armelia. A 1120 m LR en dirección SO del Picacho El Fraile. Area Natural Protegida: Delegación Gustavo A. Madero, *A. Esoibosa H. 207* (MEXU)*; ¿* September 1933, Mexico City, Serrania de Guadalupe (D. F.), *E. Lyonnet 1137* (MEXU); 10 August 1970, Vertiente NW del Cerro Chiquihuite, cerca de Cuautepec, *Rzedowski 27418* (CAS, ENCB, NY); 30 June 1973, Sierra de Guadalupe, Cerro Grande, 5 km al NNW de Cuautepec, *S. Moreno G. 261* (CAS, ENCB, MEXU, NY); September 1952, Sierra de Guadalupe, al N de la Ciudad de México, *L. Paray 552* (IEB). **MICHOACÁN:** 5 August 1986, Morelia—aprox. 2 km al Noroeste de La Concepción, *V. M. Herta B. 557* (MEXU). **MORELOS:** 28-III1981, Totolapan—Cerro Villa Nicolas Zapata *G. Ayala 74* (MEXU); **OAXACA:** 24 June 1997, San Miguel Tlacotepec—A 3.9 km de San Miguel Tlacotepec, desviación hacia Yosondaya. Distrito Juxtlahuaca, Región Mixteca, *J. I. Calzada 22005* (MEXU); 12 September 1894, Between Coixtlahuaca & Tamazulapam, 2134 –2347 m, *E. W. Nelson 1940* (NY); 17 June 1979, Concepción Buenavista, *M. Sousa 10361* (MEXU, NY); 8 July 1986, Aprox. 2 km al O de El Rodeo, *A. Salinas T. F3342, D. Frame, P. Tenorio, A. García, E. López, E. López*

(MEXU, NY); 11 September 1968, Cerro Jicote, al W de Jicotlán, *R. Cruz Cisneros 2220* (CAS, ENCB, NY); 4 May 1992, Santa Catarina Zapoquila—Cerro Yolotepec, SO de Guadalupe Membrillos. Distrito Huajuapam, Región Mixteca, *P. Tenorio L. 18269* (CAS, MEXU); 19 June 1986, Along Hwy 125 between Teposcolula and Tlaxiaco, 33.5 km S of junction with Hwy 190, 22 km N of Tlaxiaco, *C. M. Diggs Jr. 3868* (MEXU, NY); 17 June 1979, Bajo El Molino, a 2 km. al E de Santiago Tejupán (Distr. de Teposcolula), A 5 km al N de Coixtlahuaca, *M. Sousa S. 10348, 10359, L. Rico* (MEXU, NY); 18 July 1978, Along Hwy. 190, 3.2 mi, E of Tamazulapan, *C. Dziekanowski 3114, D. Dunn, M. Pennell* (NY); 8 September 1990, San Pedro Nopala—Cerro Garabatal, SW de Valle Verde. Distrito Teposcolula, Región Mixteca, *P. Tenorio L. 17066, A. Salinas, J. Sánchez-Kent* (MEXU, SD); 7 July 1981, 1 km al N de Tepescolula, sobre la vereda a San Andres, L, Distrito de Tepoescolula, Mixteca Alta, *A. García M. 413* (IEB); 6 July 1985, San Cristóbal Suchixtlahuaca—2 km NE de San Cristóbal Suchixtlahuaca, terracería a San Juan Bautista Coixtlahuaca. Distrito Coixtlahuaca, Región Mixteca *F. Chiang 2521* (MEXU); 7 October 1985, Tepelmeme Villa de Morelos—Cerro Tequelite, N de Mahuizapan. Distrito Coixtlahuaca, Región Mixteca *P. Tenorio L. 10763* (MEXU); 26 July 1979, San Juan Bautista Coixtlahuaca—2 km S de San Juan Bautista Coixtlahuaca. Distrito Coixtlahuaca, Región Mixteca *F. Chiang 165* (MEXU); 8 July 1976, San Juan Teposcolula—Cieneguilla, 4 km E de la desviación a Santa María Asunción Tlaxiaco. Distrito Teposcolula, Región Mixteca, *A. S. Magallanes 123* (MEXU); 6 July 1971, Entre Teopan y El Arroyo Garza, Distrito de Coixtlahuaca, *M. Cabrera 55* (ENCB); 20 August 1960, Highway at Puerto Herrera (km 420), just NW of Yanhuitlan 17.55 , 17.55–97.42 2500 m, *H. H. Iltis 1137, R. Koeppen, F. Iltis* (ENCB); 9 July 1969, 1.5 km al W de Magdalena Jicotlán, Distrito de Coixtlahuaca, *R. Cruz C. 2377* (ENCB); 24 September 1978, 7 km al SW de San Cristobal Suchixtlahuaca, Distrito Coixtlahuaca, *M. Sousa 9783, S. Purata* (ENCB); 11 September 1968, Cerro Jicote, al W de Jicotlán, *R. Cruz C.2220* (ENCB). **PUEBLA:** 3 October 1984, Caltepec *, P. Tenorio L. 7566* (MEXU); 16 July 1986, Xonacatlán, Mpio. Coyoaco, *F. Ventura A. 22200* (ENCB, MEXU); 21 September 1975, On W slope of Sierra Madre Oriental, 5 mi. NE of Chapulco; in watershed of Rio Salado, *G. L. Webster 20060, S. Armbruster, G. Holstein* (MEXU, NY); 19 July 1984, La Barranca de los Membríllos, *P. Tenorio L. 6695, C. Romero de T.* (IEB, MEXU, NY); 6 May 1983, El Zapote. Barranca de los Membrillos *P. Tenorio L. 3829, R. Torres, C. Romero de T.* (MEXU, NY); 26 August 1971, Oriental, Mpio. Oriental, *F. Ventura A. 4156* (CAS, ENCB, IEB, MEXU); 11 April 1984, La Barranca de los Membríllos, *P. Tenorio L. 5782* (MEXU, NY); VIII-1907, In the vicinity of San Luis Tultitlanapa, Puebla, near Oaxaca, *C. A. Purpus 2681* (US); V-1908, Puebla, In the vicinity of San Luis Tultitlanapa, Puebla, near Oaxaca. Las Naranjas, Oaxaca, *C. A. Purpus 3209* (US); VII-1907, Vicinity of Puebla, State of Puebla. Acatzinco, district de Tepeaca, *G. Arsene 2197* (US); 12 August 1987, *M. Tlapa 127, G. Ubierna* (IEB, MEXU). **SAN LUIS POTOSÍ:** 1878, Chiefly in the region of San Luis Potosí, 1829–2438 m, *C. G. Parry 168, E. Palmer* (US), Chiefly in the region of San Luis Potosí, 1829–2438 m, *169* (NY, US). **STATE OF MEXICO:** 28 September 1969, 10 km N de Chalco, *M. E. González 99* (IEB); 5 June 1977, Zumpango—Cerro Xalpan, al N de San Juan Citlaltepec *Rzedowski 34779* (ENCB, MEXU); 31 July 1954, Saucingo, Texcoco, *E. Matuda 31258* (ENCB, MEXU); 2 August 1979, Texcoco—Cerro Tetzcutzingo, 7 km al E de Tezcoco, *M. T. Pulido 99* (ENCB, MEXU); 23 June 1966, 20 km al NE de Texcoco, *Rzedowski 22450* (CAS, ENCB, NY, TEX-LL); 16 September 1951, C. Tlaltihuacan, *E. Matuda 21883* (MEXU, NY); 20 July 1967, 8 km al E de Coatlinchán, Mpio. Texcoco, *Rzedowski 24052* (CAS, ENCB); 9 June 1968, 20 km al NE de Texcoco, km 61 de la carretera a Calpulalpan, *R. Cruz Cisneros 1852* (CAS, ENCB, SD); 5 November 1975, Axapusco, Cerro de Jaltepec, *A. Ventura A. 523* (CAS, ENCB, MEXU); 18 August 1974, 3 km al W de San Cristóbal Ecatepec; base de la Sierra de Guadalupe, *Rzedowski 32136* (CAS, ENCB, MEXU, NY); 10 September 1982, Texcoco—Tepetlaostoc, *E. Ventura V. 10* (ENCB, IBUG, MEXU); 12 June 1981, Cerro Gordo, Mpio. Otumba, *M. Castilla 1271, D. Tejero* (ENCB, IEB); 9 March 1980, Cerro Gordo, S. M. Pirámides, *Castilla 647, Tejero* (ENCB, IEB); 27 August 1983, Texcoco—San Nicolas Tlamincas *E. Ventura V. 1150* (IEB, MEXU); July 1954, Camino Texcoco-Huamantla, *E. Lyonnet 540700001* (IEB, MEXU); 6 July 1975, Ranchería Buenavista, 8 km al E de San marcos, Mpio. Otumba, *C. Fuentes M. AI-7* (ENCB); 30 September 2014, Paraje Huahualtepec, Santiago Tapaicatlalpan, Xochimilco, *A. Patlán 91, C. Martínez* (ENCB); 20 June 2015, Paraje Tepepa, Santiago, Tepaicatlalpna, Xochimilco, *A. Patlán 235, C. Martínez* (ENCB); 30 August 1980, Cerro Gordo, S. J. Teotihuacán, Cerro Verde, Temascalapa, *M. Castilla 800, D. Tejero* (ENCB); not date, 3 km al N de Cuautepec, ladera andesítica, *N. Vázquez 61* (ENCB); 9 June 1968, 20 km al NE de Texcoco, km 61.5 carrt. México-Veracruz, vía Apizaco, *A Pineda R. 272* (ENCB); 9 June 1968, Km 61.5 de la carretera México-Veracruz, vía Apizaco, 20 km al NE de Texcoco, *L. Rodríguez J. 16* (ENCB); 24 September 1983, Estación Expermiental Zoquiapan, Mpio. Chalco, *Ortíz B. L. s.n.,* (ENCB); 24 Septemebr 1983, Estación Experimental Zoquiapan, cerca de Llano Grande, Mpio. Chalco, *L. Ortiz B. s.n.* (ENCB). **TLAXCALA:** 3 November 1964, 15 miles east of Calpulalapan, *H. D. Ripley 13632, R. C. Barneby* (NY); 10 July 1992, Mpio. Tlaxco, 9 km al NNE de Capula, sobre la desviación Estación Mena- Emiuliano Zapata, *J. Santana C. 407* (IEB)*, A. Martínez B., S. Camargo R., M. Flores C.* (IEB); 19 July 1980, Tlaxco, *H. Vibrans*

s.n. (IEB); 30 June 1990, Españita—"El Potrero", entronque carretera Españita-Méx., Veracruz, *R. Ramírez 242* (MEXU); 9 July 1967, 4 km al W de Apizaco, *E. Ruiz B. 38* (ENCB).

93. *Astragalus tephrodes* A. Gray var. ***tephrodes***

Type:—USA, New Mexico, plains at the base of the Organ Mountains, 30 April 1852, *C. Wright s.n.* (holotype: GH00058959 digital image!).

Astragalus tephrodes A. Gray, Smithsonian Contr. Knowl. 5(6): 45. 1853.—*Tragacantha tephrodes* (A. Gray) Kuntze, Revis. Gen. Pl. 2: 948. 1891.—*Xylophacos tephrodes* (A. Gray) Rydb., Bull. Torrey Bot. Club 52: 147, 156. 1925.—*A. tephrodes* A. Gray var. *typicus*, Amer. Midl. Nat. 37: 465. 1847.

Perennial. Stems short and shorter than largest leaves, up to 15 cm long, or acaulescent, prostrate with age, pubescent, pilose, the trichomes up to 0.8 mm long. **Stipules** up to 2.5 cm long, trichomes 0.4–0.7 mm long, appressed o incurved; **Stipules** 2–7.2 mm long, lanceolate to ovate. **Leaves** 4.5–19 cm long, leaflets 11–31, 3–17 mm long, elliptic to oblanceolate, retuse or subacute, adaxially glabrate to sublgabrate adjacent to midvein. **Peduncles** 4–17 cm long, incurved, ascending, erect when young, recurved to prostrate with age; the racemes 2–8.5 cm long, lax, flowers 10–20. **Flowers** pink, purple, lilac, white with purple tones, sometimes turning bluish when drying; the calyx 4.8–9.2 × 3.2–4 mm, minute pilose, trichomes up to 0.7 mm long, white or black and white mixed, straight, the tube 4.5–7 mm long, cylindrical or campanulate, sometimes with purple tones, the teeth 1.2–2.3 mm long, subulate to triangular; the banner 10.7–17.5 × 6.7–8 mm, obovate, to rhombic or elliptic, shallowly retuse; the wings 11.8–17.5 × 2.3–3.2 mm, the claw 4.2–9 mm long, the blade 7.2–9 mm long, lanceolate to oblong, distally oblique; the keel 9.2–14.7 × 2.9–3.8 mm, the claw 4.5–12 mm long, the blade 5.6–8 mm long, apically oblique, lunate to elliptic. **Pod** ascendant, humistrate with age or soon, 10–23 × 5–8 mm, sessile, oblique, ovoid, distally acuminate, somewhat compressed, dorsally flattened or somewhat convex, ventrally strongly carinate, basally, rounded to truncate, distally contracted in a triangular to long acuminate 3–6 mm long beak, the valves somewhat leathery, somewhat rigid, densely pilose, septum absent; ovules 24–45; seeds 1.8–2.2 mm long, mitten shaped, brown or dark-brown, opaque.

Distribution:—In Mexico, recorded only in extreme northern Chihuahua, in close proximity to the USA border. Also, in New Mexico and Arizona (USA) (Fig. 26).

Habitat:—Arid scrublands, desert areas; 1400–1700 m.

Comments:—Description of this species was made from specimens near the border with Mexico (15-IV-1995, *R. D. Worthington 24628* (NY); 5-IV-1970, *R. Spellenberg* 2231 (NY). This arid zone of northwestern Mexico along with New Mexico and Arizona concentrate several species such as *A. allochrous, A. cobrensis* var. *maguirei, A. humistratus* var. *sonorae, A. lentiginosus* var. *borreganus, A. mollissimus* var. *bigelovii, A. nothoxys, A. nuttallianus* var. *austrinus, A. thurberi* and *A. wootonii* var. *wootonii*. But only three of the species (*A. cobrensis* var. *maguirei*, *A. mollissimus var*. *bigelovi* and *A. tephrodes*) have widened lanceolate, elliptic, oblong, obovoid or clavate-elliptic pods, never triquetrous or inflated like a bladder. *Astragalus mollissimus* var. *irolanus* is easily discerned by its long calyx (10.5–13.5 mm long), and *A. cobrensis* var. *maguirei* has short petals, never longer than 8 mm long.

Specimens examined:—CHIHUHAHUA: not date, Mexican Boundary Survey, Valley of the Rio Grande, below Doñana, *C.C. Parry, three samples, s.n.* (code bars 0128 3327), *260 & 265, C. Wright, A. Schott.* (NY). **NEW MEXICO (Very near to the Mexican border):** 20 April 1973, Luna Co., U.S. Highway 70–80, 7.4 miles west of Dona Ana County line, *N. H. Holmgren 6897* (NY); 20 April 1973, Luna Co., Florida Mountains, 14 airline miles southwest of Deming, *N. H. Holmgren 6887* (NY); 15 April 1995, Luna Co., Cedar Mts., about 10 air mi. ENE of Hachita, 1 mi N of the Williams Ranch in low area of mts. where graded road crosses and passes N to Gage, *R. D. Worthington 24628* (NY); 17 May 1992, Dona Ana Co., Approx. 2 air miles south-southeast from top of Bishop Cap along Santana Road in small community east of Vado, *R. D. Worthington 20873* (NY); 8 April 1989.

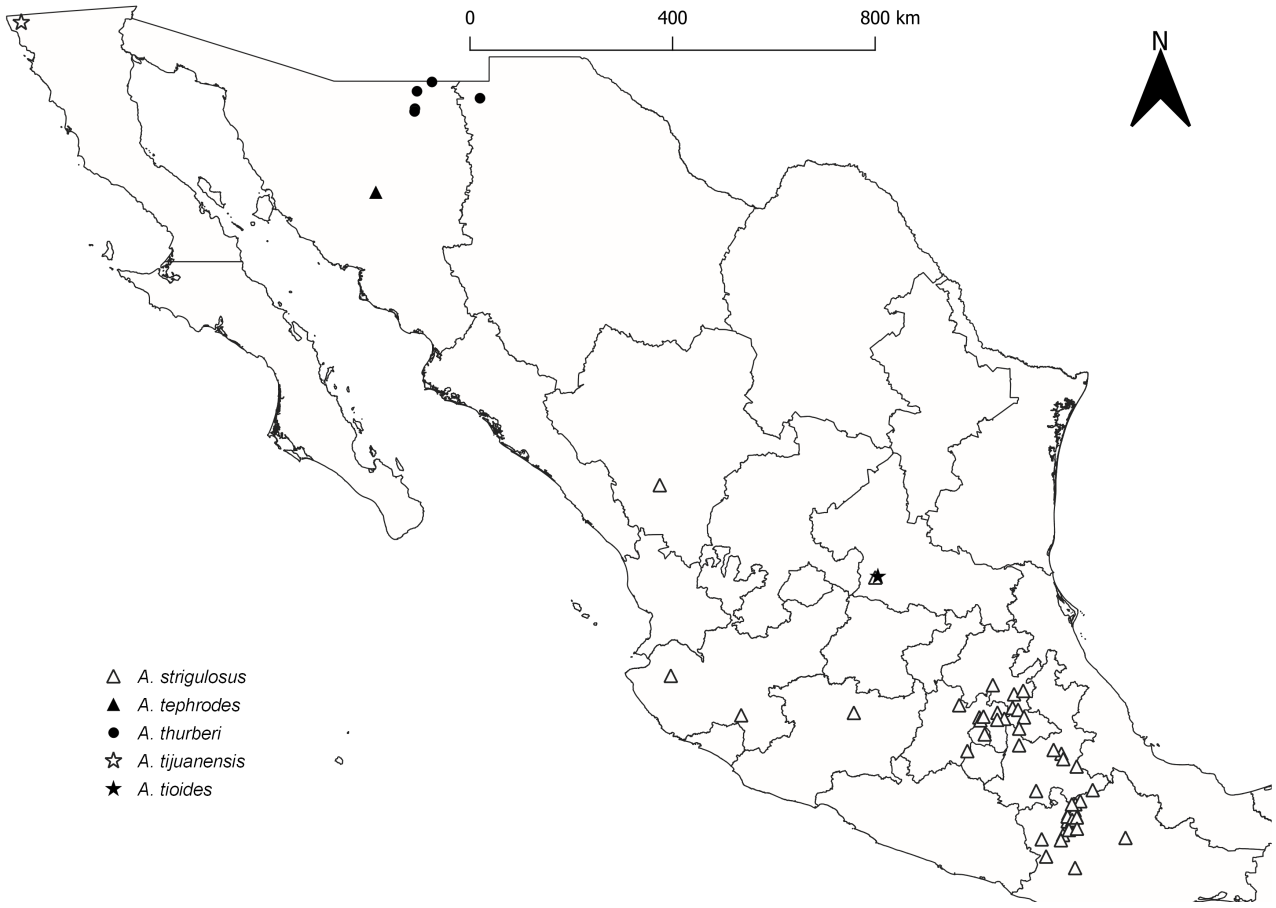

FIGURE 26. Map showing the distribution of *Astragalus strigulosus, A. tephrodes, A. thurberi, A. tijuanensis,* and *A. tioides* in Mexico.

94. ***Astragalus thurberi*** A. Gray, Pl. Nov. Thurb. 312. 1854

Type:—MEXICO, Sonora, "Near Fronteras, & c. Sonora, in dry places; June 1851, *Thurber 372* (holotype: GH00059442 digital image!; isotype: NY00005853 digital image!, K000999394 digital image!, MO-128311 digital image!, GH00058968 digital image!, NY01268419 digital image!).

Tragacantha thurberi (A. Gray) Kuntze, Revis. Gen. Pl. 2: 948. 1891.—*Phaca thurberi* (A. Gray) Kearney, Trans. New York Acad. Sci. 14: 34. 1894.

Perennial but of short duration. **Stems** up to 45 cm long, decumbent and ascending, strigose, trichomes short, up to 0.5 mm long, sub-apressed or straight. **Stipules** 2–8 mm long, free, deltoid to triangular, somewhat decurrent basally, not connate. **Leaves** 2–11.5 cm long, leaflets 7–21, 5–18 mm long, linear, oblong, elliptic, to oblanceolate, adaxially truncate o somewhat notched and mucronate. **Peduncles** hard, 3–9 cm long; the racemes 2–11 cm long, dense, flowers 7–32. **Flowers** purple, red-purple, red-lilac, rarely white-yellowish; the calyx 3.3–5 × 1.7–2.5 mm, strigose, trichomes white, sometimes few black ones present, the tube 2.2–3 mm long, campanulate, the teeth 1–2.3 mm long, subulate, one pair longer than rest; the banner 5.7–7.1 × 4.2–6 mm, recurved, ovate to suborbicular, basally narrowed, apically slightly retuse; the wings 5.1–6.7 × 1.6–2.4 mm, the claw 1.8–2.5 mm, the blade 3.6–5 mm long, oblong to obovate, distally oblique, incurved; the keel 4.7–5.6 × 1.7–2 mm, the claw 2–2.9 mm long, the blade 2.6–3.4 mm long, apically oblique, somewhat obovate. **Pod**, when mature, compact in the infrutescence, spike-shaped, oblong-head or even cylindrical, extended or deflexed, sessile, 6–14 × 6–10 mm, inflated like a bladder, basally rounded, distally contracted in a very short beak, sulcate or not so along sutures, the valves green or sometimes with purple tones, strigose, turning papery and ochre with age, reticulate; septum absent; ovules 8–11; seeds 1.7–2.5 mm long, mitten shaped, golden, brown or ochre, smooth, opaque.

Distribution:—In Mexico, recorded only in the northwestern portion, in northern Sonora (from Nogales, north Cananea, Naco to Agua Prieta) and Chihuahua (San Luis, El Valle, El Berrendo to Las Palmas, 31°18'N–108°18'W), in close proximity to New Mexico and Arizona (USA). Also, in New Mexico and Arizona (USA) (Fig. 26).

Habitat:—Rocky hills; volcanic and sandy soils; arid plains; sandy streams; grasslands; disturbed areas, desert scrubs with juniper, prickly-pear, acacia, mesquite, Joshua tree, *grasses*; disturbed areas with juniper-mesquite; natural grassland with mesquite, Joshua tree, prickle pear; desert grassland; 1166–1402 m.

Comments:—The Mexican geopolitical border between Chihuahua and Sonora along the USA border (New Mexico and Arizona) acontain several species with inflated pods, including *A. allochrous, A. mollissimus, A. thurberi,* and *A. wootonii* var. *wootonii*. Both, *Astragalus thurberi* and *A. wootonii* have small flowers (banner averaging 4.6–7.5 mm long, wings 4.1–7.5 mm long, and keel 4.1–6.4 mm long)but they can be differentiated easily by the pod size, which is much longer and wider in *A. wootonii* (averaging 14–42 mm long, 11–18 mm wide).

Specimens examined:—CHIHUAHUA: 20 March 1984, Rolling hills 0.4 miles east of Highway 2 at a point 5.2 road miles northwest of Arroyo Salto de Ojo and 14.3 miles northwest of Janos, *A. C. Sanders 4726, W. Charlton, McIntosh, VanWay, Gibeaut, Gould* (NY). **SONORA:** 19 March 1984, Agua Prieta. Along Highway 2, ca. 26 miles east of Agua Prieta and ca. 24 miles west of the state line at Puerto San Luis, *A. C. Sanders 4707, W. Charlton, V. Way, McIntosh, Gibeaut, Gould* (CAS, JEPS, SD); 20 March 1984, Rolling hills 0.4 miles east of Highway 2 at a point 5.2 road miles northwest of Arroyo Salto de Ojo and 14.3 miles northwest of Janos, *A. C. Sanders 4726, W. Charlton, V. Way, McIntosh, Gibeaut, Gould* (NY); 1963, 7.9 miles north of Esqueda, *I. L. Wiggins 11780* (CAS, US); VI-1851, Dry plains, near Fronteras, *G. Thurber 372* (NY); 16 May 2010, Rancho Puerta Blanca, Cuenca Los Ojos, Foundation property , 40.7 km by air E of Agua Prieta, *A. L. Reina G., 2010-425, T. Van Devender* (USON); 12 April 2003, 4 km SE of Ezqueda, on road to Agua Caliente, *A. L. Reina G. 2003-500, T. R. Van Devender* (USON); 30 April 2006, 33.7 km E of Agua Prieta on Mex. 2, Rancho Guadalupe, *A. L. Reina G. 2007-491, T. R. Van Devender* (USON); 10 April 2003, Fronteras—Esqueda *A.L. Reina G. 2003-414, T.R. Van Devender, G. Anderson* (MEXU); Rancho El Aribabi, Cordón de Las Pilas, a 4.5 km línea recta al SE de la casa del rancho, a 22.4 km al ESE de Imuris, Mpio. Imuris, *2010-005 A. K. Enriquez et al.* (USON).

95. ***Astragalus tijuanensis*** A. E. Estrada, Rebman, C. González & Villarreal, Phytotaxa 577(1): 1–13

Type:—MEXICO. Baja California (Municipio Tijuana): Boulevard 200, at the surroundings south side of the city of Tijuana, Baja California, in a recent burned area, 32° 20’11.04” N, 116°57’44.593” W, alt. 171 m, 5 June 2022, *C, González 104* (Holotype SD!; isotype MEXU!).

Perennial with deep single buried root, without superficial crown of a woody taproot, 13 × 0.7 cm long. **Stems** three to several, up to 30 cm long, 3–7.5 mm diameter, erect, arising from the base, the lower part of the stems, 7–10 cm, gray color, with stipules and lower leaves persistent, without leaflets, the upper part of the stem geen, striate, densely strigulose, the trichomes 0.1–0.3 mm long, appressed, white. **Stipules** free or semi-amplexicaul, clasping ¼ to ½ of the stem´s circumference, 2–3 × 3–4 mm, persistent, almost always wider than longer, triangular to triangular-ovate, white to light brown, sparsely strigulose or glabrate, with only few trichomes on the edges. **Leaves** 4.5–8.5 cm long, petiole (3–)11–12(–17) mm long, leaflets (17)21–29(33) opposite, rarely some of them alternate, (2–)8–10 × 0.7–1 mm, linear to linear-oblong, glabrate and light-green adaxially, and dark-green and sparsely strigulose abaxially as stem pubescence, flattened or slightly concave, acute at both ends. **Peduncles** erect or incurved-ascending, 2–3 cm long, elongating with age (5–)7–11(–14) cm long, exceeding the length of the leaves, sparsely strigulose, trichomes white; the recemes 1.5–5 cm long, flowers 13–19. **Flowers** white with purple tones; the calyx (3.5–)3.9–4(–4.2) ×2.5–2.7 mm, campanulate, the tube 3.2–3.3 mm long, inequilaterous, green mixed with purple, sparsely strigulose, the trichomes white and purple mixed, occasionally sub-glabrous, the teeth 0.7–0.9 mm long, triangular to triangular-subulate; the banner sessile, 12.5–13 × 6.3–7 mm, obovate, elliptic obovate to obovate-rhombic, gradually attenuated at the base, apex noteche, the notch 0.4–0.5 mm deep; the wings 11.9–12.2 × 2–2.3 mm, the claw 5–5.2 mm long, the blade 6.8–7 mm long, straight, narrowly obliquely oblong-obovate, rounded to truncate at apex, basally auriculate; the keel 9.4–9.8 × 2.5–2.8 mm, the claw 4.8–5 mm long, the blade 4.6–5 mm long, half obovate, incurved, apex rounded, auriculate. **Pod** spreading or slightly ascending, sessile, (17–)19–20(–24) ×6–8 mm, incurved, semi-lunate in profile, at first subcylindrical to elliptic, sub-fleshy, and at maturity strongly compressed laterally or low convex at the lateral faces, somewhat plumpy (not inflated like a bladder), ventral suture concave, keeled, dorsal suture almost straight to low convex, base acute, apiculate and rigid at the apex, the beak 0.7–1 mm long, with the sub-persistent style, the valves coriaceous, stramineous, brown to light-brown, glabrous, noticeably transversely reticulate and wrinkled, unilocular, septum absent; dehiscence apical; seeds 1.9–2.2 mm long, mitten-shaped, black, opaque.

Distribution:—As far as we know, *Astragalus tijuanensis* is only known from the type locality, at the surroundings south side of the city of Tijuana, Baja California (Fig. 26),

Habitat:—In a recent burned area, inhabiting arid shrublands, in open gravelly or clayish hillsides, low slopes or flats, on clayish substrate, associated to arid shurblands.

Comments:—In the area where *A. tijuanensis* develops, five other *Astragalus* species are distributed that can be easily distinguished by their particular morphological characters, *A. brauntonii* var. *lativexillum* (compact inflorescences, pod less than 1 cm long), *A. acutirostris* (triquetrous pod), *A. didymocarpus* (ovary with two ovules and inflated bladder-like pod), *A. idrietorum* (inflated, semi-transparent pod with 8–12 ovules) and *A. palmeri* (pod inflated, pubescent).

96. *Astragalus tioides* (Rydb.) Barneby, Mem. New York Bot. Gard. 13: 171. 1964

Type:—MEXICO, San Luis Potosí, Valley of San Luis Potosi, 1876, *Schaffner 822* (holotype (based on *Athelophragma tioides*): GH00059443 digital image!; isotype (*Schaffner 617* & *822*): P00585179 digital image!, PH00005762 digital image!).

Atelophragma tioides Rydb., Bull. Torrey Bot. Club 55: 157. 1928.

Perennial. Stems up to 50 cm long, decumbent or almost ascendant, strigose to pilose, trichomes rigid up to 0.8 mm long, mostly appressed with some longer and ascendant ones. **Stipules** 2–6 mm long, clasping and connate, bidentate, the upper ones slightly longer and simple. **Leaves** 3–8 cm long, leaflets 7–21, 2.5–12 mm long, oblong to obovate, entire or notched apically, bicolored, abaxially clearer and glabrate. **Peduncles** 3.5–10 cm long; the racemes short, 0.4–3 cm long, flowers few, 2–5. **Flowers** purple; the calyx 5.3–6 × 2–2.7 mm, pilose, con trichomes white and black, the tube 3–3.3 mm long, campanulate, the teeth 2.2–2.7 mm long, subulate; banner 11 × 5–6 mm, obovate, basally narrowed, recurved; the wings 8.8–9.1 × 1.9–2.1 mm, the claw 3.6–3.9 mm long, the blade 6.2–6.5 mm long, apically oblique, straight or almost so; the keel 7–7.1 × 1.9–2.2 mm, the claw 3.8–4.1 mm long, the blade 3.3–3.9 mm long, distally oblique, thence almost obovate, and incurved. **Pod** 20–35 × 3–6.3 mm, deflexed, stipitate (stipe 1–2 mm long), linear to oblong, straight o somewhat curved, narrowed in both ends, dorsoventrally compressed, ventrally carinate, dorsally wide and openly sulcate, the valves somewhat fleshy, glabrate, turning papery-rigid, ochre to black with age, reticulate, septum almost complete; ovules 18–22; seeds 2.6–2.6 mm long, mitten shaped, brown, smooth.

Distribution:—Endemic to Mexico, southwestern San Luis Potosí (San Luis Potosí City). This species is very rare and has few specimen collections. We do not know the conservation status of this species, however, a good part of the collections come near the city of San Luis Potosí, where the last recorded collection was made in 1954 on the road from San Luis Potosí to Tampico. Perhaps this path is the last route to find this rare species. Since the areas where it was recorded in the 19th and 20th centuries were in areas near San Luis Potosí, today these localities may no longer exist in their natural landscape (Fig. 26).

Habitat:—No specific locality registered.

Comments:—The region that includes the City of San Luis Potosí and surrounding areas, contains at least 11 species of *Astragalus*. Only three of them have linear, elliptic, oblong, never triquetrous pods, *A. potosinus, A. strigulosus* and *A. tioides*. *Astragalus strigulosus* can be distinguished by its ochroleucous flowers, never purple as in *A. tioides* and *A. potosinus.* Both of these species are easily distinguished, since the latter has racemes with 8–20 flowers, and smaller petals (standard 7.4–8.4 mm, wings 7.1–8.3 mm, and keel 5.8–6.3 mm).

Specimens examined:—SAN LUIS POTOSÍ: 1878, Chiefly in the region of San Luis Potosi, *C. C. Parry 176, E. Palmer* (NY); 1879, San Luis Potosí, *J. G. Schaffner 612* (NY, US); non date, San Luis Potosi, *Schaffner 822* (MEXU); En route from San Luis Potosi to Tampico (Tamaulipas), *Palmer 176* (US).

97. *Astragalus tolucanus* Robinson & Seaton, Porc. Amer. Acad. 28: 104. 1893

Type:—MEXICO, Estado de Mexico, on drier ridges under pines, Nevado de Toluca, 12000 ft, 6 September 1892, *C. G. Pringle 4238* (holotype: GH00059444 digital image!; isotype: E00383739 digital image!, E00383738 digital image!, BR0000005189571 digital image!, RSA0003138 digital image!, ENCB003334 digital image!, MEXU01169232 digital image!, COLO00350777 digital image!, P00585180 digital image!, BR0000005189908 digital image!, MU000000141 digital image!, K000478266 digital image!, US00001624 digital image, NY00005854 digital image, MEXU01169234 digital image!, S10-1793 digital image!, AC00319848 digital image!, US01014055 digital image!, RM0002477 digital image!, MO-128355 digital image!, BM000931696 digital image!, JE00010699 digital image!, PUL00000256 digital image!, G00441208 digital image!).

Atelophragma tolucanum (Robins. & Seaton) Rydb., Bull. Torrey Bot. Club 55: 156. 1928.
Atelophragma bracteatum Rydb., Bull. Torrey Bot. Club 55: 161. 1928.

Perennial. Stems many, up to 50 cm long, diffuse, decumbent, minute strigose, the trichomes up to 0.4 mm long, subappressed. **Stipules** 1.5–6 mm long, clasping and connate for a half of its length, triangular, the upper ones lanceolate little longer and connate basally only. **Leaves** 2–8 cm long, leaflets 13–25, 3–14 mm long, oblong, elliptic to ovate, obtuse, distally truncate or retuse, adaxially glabrate. **Peduncles** 2.5–11 cm long; the racemes 2–7 cm long, dense when young, lax with age, flowers 15–30. **Flowers** pale purple to pink-purple, blue or the banner purple veined; the calyx 6.2–9.4 × 2.3–2.8 mm, strigose, trichomes black, the tube 3.2–4.5 mm long, campanulate, the teeth 2.5–4.7 mm long, lanceolate; the banner 10–13 × 4–6 mm, oblanceolate, basally narrowed, slightly notched, recurved; the wings 9.5–10.5 × 1.4–2.4 mm, the claw 4–5 mm long, the blade 6.2–7.7 mm long, oblanceolate, distally oblique, almost straight; the keel 7.8–8.4 × 2.2–2.6 mm, the claw 3.8–4.8 mm long, the blade 4–4.5 mm long, distally oblique, thence incurved. **Pod** 10–15.3 × 4–6 mm, deflexed, stipitate (stipe 2–3 mm long), oblong to elliptic, straight or almost so, narrowed at both ends, distally short cuspidate, somewhat compressed, laterally rounded, dorsally wide sulcate, the valves thin, glabrate or strigose, the trichomes black, turning papery and brown with age, reticulate, septum incomplete; ovules 5–14; seeds 2–2.4 mm long, mitten shaped, brown, smooth.

Distribution:—Endemic to Mexico, central region of Mexico, in the State of Mexico (Nevado de Toluca, Sultepec, Temsacaltepec, and Santiago Tlazala), also in Hidalgo (Epazoyucan) (Fig. 27).

Habitat:—Oak scrubland; fir forest; cleared pine forest, associated with short dense grassland; cold pine forest; 2750–3910 m

Comments:—Undoubtedly, this species forms part of a species complex together with *A. guatemalensis, A. hidalgensis* and *A. strigulosus*, which are characterized by their clasping and connate stipules, stipitate, oblong to elliptic, widened, never triquetrous or inflated bladdery pods. Of these species, *A. strigulosus* is distinguished by its white petals; *A. hidalgensis* (both varieties) has small petals, never larger than 7.8 mm long, *A. tolucanus* and *A. guatemalensis* var. *brevidentatus* are physiognomically very similar to each other, but *A. g*. var. *brevidentatus* has both, the calyx (3.2–6 mm) and its sepal teeth (0.6–2.5 mm) shorter, and relatively larger pods (21 mm long).

Specimens examined:—HIDALGO: 21 July 1988, Cuyamaloya, 3 km al NNW de Matías Rodríguez, Mpio. De Singuilucan, *M. Medina C. 3676, M. A. Barrios* (IEB); 29 July 1938, El Chico,*E. Lyonnet 2208* (MEXU, US); 4 August 1963, 6 km al W de Real del Monte, *Rzedowski 17040* (ENCB); 24 August 1972, 1 km al S de EL Guajolote, Mpio. Epazoyucan, *Rzedowski 29209* (ENCB); 16 August 1975, 0.5 km después del crucero a EL Chico, Crucero Real del Monte, *I. García G. 285* (ENCB); 22 June 1975, alrededores del cerro Las Ventanas, Mpio. El Chico, *Rzedowski 33280* (ENCB); 3 August 1975, 2 km all SW de EL Guajolote, Mpio. Epazoyucan, *M. Medina C. 567* (ENCB); 19 June 1976, 1 km al SSW de Las Ventanas, Mpio. El Chico, *M. Medina C. 1434* (ENCB); 12 August 1971, 4 km all W de Real del Monte, *Rzedowski 28437* (ENCB). **MEXICO CITY:** 20 October 2010, *J. L. Díaz s.n.* (MEXU); VIII September 1930, Federal District: Peña de Los Charros, *P. G. Rusell 144, M. J. Souviron* (US); 2 August 2002, Cerro Nepanapa por la terracería que va a cabaña Pelagatos. Área Natural Protegida: Nepanapa. Delegación Milpa Alta, *F. César G. 372* (MEXU); 11 August 1957, Entre Las Palmas y San Miguel, Sierra de Las Cruces, *L. Paray 2406* (ENCB). **MICHOACÁN:** 14 August 2015, Ocampo, *D. Álvarez 15927* (MEXU). **MORELOS:** 9 August 1964, *J. Arvizu 44* (MEXU). **STATE OF MEXICO:** 20 August 1943, Trans-Mexican Volcanic Belt. In open woods of Pinus, western side of Nevado de Toluca, 3 km. southeast of San Juan, *R. T. Clausen 6019, R. C. Godinez* (ENCB, NY, TEX-LL, US); 6 October 1932, Mesón Viejo, *G. B. Hinton 1900* (MEXU, NY, US); 6 September 1892, *C. G. Pringle 4238* (MEXU, NY); IX-1937, Cerro Cabeza (Estado de Mexico), *E. Lyonnet 1616* (US); 12 July 1938, Nevada de Toluca, Mex., 3536 m, *E. K. Balls 5023* (US); 26 April 2015, Nevado de Toluca, 3.8 km después de la caseta del parquet Los Venados , subiendo por el camino hacia los lagos del crater, *Y. Ramírez A., V. W. Steinmann 2361* (IEB); 23 August 1947, *F. A. Barkley, G. L. Webster, B. L. Westlund 82* (MEXU); 20 August 1943, Western side of Nevado de Toluca 3 kn southeast of San Juan, *R. T. Calusen 6019* (MEXU); 2 October 2001, Metepec—Ferrocarril Toluca-México, paralelo al paseo Tollocán, a la altura de Chrysler y de la salida a Metepec, *H. Vibrans 7537* (MEXU); 10 June 1932, Mesón Viejo, *G. B. Hinton 1900* (MEXU); 6 September 1958, Nevado de Toluca; northwest side of mtn, *J. H. Beaman 2481* (MEXU); 19 August 1971, Alrededores de la Presa Iturbide, Mpio. Iturbiude (Santiago Tlazala), *Rzedowski 28560* (ENCB); 18 July 1968, Plaomas, Mpio. Iturbide (Santiago Tlazala), *Rzedowski 25902* (ENCB); 7 August 1977, Alrededores de la Presa Iturbide, 6 km al WNW de Santiago Tlazala, *Rzedowski 35108* (ENCB); 6 July 1968, Alrededores de la Ranchería El Capulín, Mpio. Tescaltitlán, *D. García S. 234* (ENCB); 4 August 1962, Nevado de Toluca, *Rzedowski 15772* (ENCB); 14 August 1964, Nevado de Toluca, *L. González Q. s.n.* (ENCB); 16 July 1965, NW slopes of Nevado de Toluca, 10 km (by road) SW of jct of roads to Sultepec and Temascaltepec on Hwy 130 to Temascaltepec or 27 km (by road) SW of Toluca, *K. Roe 264, E. Roe, S. Mori* (ENCB); 4 August 1962, *L. Huerta M. s.n.* (ENCB).

98. ***Astragalus trichopodus*** (Torr. & A. Gray) A. Gray var. ***lonchus*** (M. E. Jones) Barneby, Barneby, Mem. New York Bot. Gard. 13: 821. 1964

Type:—USA, California, San Diego, 17 March 1882, *Jones 3083* (holotype: based on *A. leucopsis* var. *lonchus*): RSA0002966; isotype: GH00058807 digital image!, CAS0026629 digital image!, RSA0002992 digital image!, P00585173 digital image!, NY00005517 digital image!, NY01344200 digital image!, CAS0027710 digital image!, NY01365131 digital image!, NY01365131 digital image!, MO-149312 digital image!).

Astragalus leucopsis (Torr. & A. Gray) Torr. var. *lonchus* M. E. Jones, Rev. N.-Amer. *Astragalus* 119, tab. 19. 1923.—*Phaca leucopsis* Torr. & A. Gray, Fl. N. Amer. (Torr. & A. Gray) 1(4): 694. 1840.—*Astragalus leucopsis* (Torr. & A. Gray) Torr., Rep. U. S. Mex. Bound., Bot. [Emory] 56, t. 16. 1859.—*Tragacantha leucopsis* (Torr. & A. Gray) Kuntze, Revis. Gen. Pl. 2: 946. 1891; *Phaca canescens* Nutt., Fl. N. Amer. (Torr. & A. Gray) 1(2): 344. 1838.

Phaca encenadae Rydb., N. Amer. Fl. 24(6): 336. 1929

Perennial, robust. **Stems** up to 100 cm long, single, several or multistemmed, almost always erect or diffuse, striate, basally fistulous, strigose to villous, commonly distally white-canescent, trichomes up to 0.7 mm long, ascendant or straight. **Stipules** 2–7 mm long, semi-clasping, very rarely the basal ones connate, triangular to lanceolate. **Leaves** 3–20 cm long, leaflets 15–39, 2–27 mm long, lanceolate oblong, elliptic to spathulate, distally obtuse and mucronate or notched, adaxially glabrate or pubescent. **Peduncles** 4–30 cm long; the racemes 2–17 cm long, lax, flowers 10–50. **Flowers** green-white, cream, yellowish-cream or with pink-purple veins; the calyx 5–8.8 × 2.5–4.8 mm, strigose, trichomes white or white and black mixed, the tube 3.5–5.6 mm long, campanulate, basally inequilateral, thence oblique to turbinate or rounded, the teeth 0.9–3.7 mm long, lanceolate; the banner 11.3–19 × 5.4–10 mm, rhombic, elliptic, rarely ovate to oblanceolate, slightly notched; the wings 10–16.1 × 1.6–3.2 mm, the claw 4.4–7.9 mm long, the blade 6–9.7 mm long, linear to oblanceolate, straight, distally oblique, slightly incurved; the keel 8.3–13.4 × 2.2–3.4 mm, the claw 4.5–8 mm long, the blade 4.6–6.4 mm long, somewhat rounded-obovate, sometimes triangular-obovate, apically oblique, thence incurved. **Pod** 1.5–4.5 × 0.8–2.1 cm, deflexed, stipitate (stipe 7–17 mm long, glabrous, continuous with the pod, so the pod firmly attached to the receptacle, lasting for a time, not soon caducous), oblique, ovoid or almost ovoid, inflated, like a bladder, sometimes somewhat laterally compressed, the valves thin, ventrally straight or strongly convex, dorsally more strongly convex than the ventral one, turning papery, ochre and shiny with age, reticulate, septum absent, the valves strigose, trichomes white or sometimes with black ones, rarely apically glabrate or completely glabrate; ovules 10–30; seeds 1.8–3.3 mm long, mitten shape, brown, dark-brown or greenish, smooth, opaque.

Distribution:—In Mexico recorded from Baja California, along the entire northwestern coast from Rosarito (32°22'N–117°03'W) to Santa Rosalillita (28°40'N–114°16'W), plus on Coronado (32°26'N–117°15'W), Todos Santos (31°48'N–116°47'W) and Smith Islands (29°02'N–113°31'W), and. Also, in California (USA) (Fig. 27).

Habitat:—Volcanic, sandy, clayey, reddish, gravel soils; granite canyons; sandy dunes; coastal plains; along estuaries; roadside; streams; disturbed areas; adjacent sandy coastal cliffs; coastal plains near the coast; dry slopes with chaparral; associated to desert shrublands, columnar cacti, jojoba, and prickly-pear; riparian desert scrubland with salt cedar; oak forest; plains with cactus and maguey; associated with; creeks with thorny scrublands; coastal scrub with maguey; sandy grasslands; desertic scrub with cirio; coastal scrublands with sumac, ash, sycamore; highly disturbed sandy swale with salt bush; 21–475 m.

Comments:—The northwestern coast and areas adjacent to these in Baja California are characterized by their enormous diversity of *Astragalus* species. The range of *A. t.* var. *lonchus* overlaps with various species with inflated pods, but four of them can be distinguished by the presence of a stipe or a gynophore that elevates the pod above the receptacle, *A. fastidius, A. oxyphysopsis, A. oxyphysus* and *A. t.* var. *lonchus*. Morphologically the four species are almost identical in size, stipule adherence, leaf size, leaflet number, flower color, etc., however they are easily distinguished from each other based on the type of pod inflation and the structure that raises the pod above receptacle. *Astragalus trichopodus* var. *lonchus* and *A. fastidius* have completely inflated pods, but the pod of *Astragalus fastidius* is elevated from the receptacle by an articulated gynophore, while the one of *A. trichopodus* var. *lonchus* is elevated from the receptacle by a continuous stipe with the pod. The other two species, *A. oxyphysus* and *A. oxyphysopsis* have fruits that are inflated and bladder-like only in the central part and are laterally strongly flattened.

Specimens examined:—BAJA CALIFORNIA: 1 June 1994, On coastal flats to the west of Mex. Rte. 1 between San Quintin and El Rosario; approx. 9 miles north of El Rosario, *J. Rebman 2759, D. Pinkava, ASU Herb. Group* (BCMEX; SD23 March 1930, Santa Maria Plains 23 miles south of Hamilton's Ranch, *I. L. Wiggins 4538* (NY); 12 April 1882, Encenada, *M. E. Jones 3676* (NY); 10 June 1926, Ensenada, *M. E. Jones s.n.* (NY); 22 March 1971, Ca.

125 mi. SSE of Ensenada, directly NW of Bahia de San Quintin., *T. W. Eakle 56* (NY); 3 January 2000, Tributary of Arroyo El Sauce, 1.75 km (road) north of Hwy 1, about 31 km east of El Rosario, *M. Fishbein 4156*, *S. McMahon, K. Hooper, M. Hedin, M. Lowder* (NY); 14 March 1987, S of Valle de las Palmas: a few km S of Valle de las Palmas, side of Hwy 3 (Tecate-Ensenada), *R. F. Thorne 62159, A. Liston, O. Mistretta* (NY); 17-III1956, East of San Quintin near Santa Maria, *J. T. Howell 31058* (CAS, NY, SD); 15 March 1975, West slope of Mesa Redonda. *R. Moran 21644* (NY, SD); 2 June 1963, Rancho El Ciprés, *R. Moran 11040* (NY); 3 May 1976, Roadside at east end of San Telmo Valley, *R. Moran 23097* (ENCB, NY, SD); 23–24 April 1984, Arroyo just W of Hwy 1 near gravel quarry, ca. 6.7 mi. S of Socorro Wash (Arroyo Hondo), *R. F. Thorne 58009, W. Wisura, P. Peterson, C. Annable* (BCMEX, MEXU, NY); 27 February1934, Two miles from Tijuana on the Ensenada road, *R. S. Ferris 8472* (NY, US); 2 March 1934, North side of Colnett wash at ocean, *R. S. Ferris 8516* (NY); 28 November 1987, Vado El Rayado. 7.5 mi S of El Rosario, *MA (Ben) Franklin 5658, 5671, J. Chandler* (NY); 22 May 1974, Punta Banda at Pacific Ocean, ca. 11 mi W of Rte. 1 at Ensenada, *Reeves, Hensel, McGill, D. Pinkava P12089, E. Letho* (NY); 18 May 1988, Along Mexico Highway 1D near Punta Salsipuedes, 1.5 mi South of La Salina and 1.7 mile north of the Baja Mar Exit, *J. L. Reveal 6802* (CAS, NY); 20 December 1975, ± 2 mi. S. of San Quintin, *C. D. Johnson 85-75* (NY); 15 March 1980, Islas de Tods Santos, S. island, *R. F. Thorne 53971, W. Wisura, D. Michener et al.* (ENCB, NY, SD); 1 April 1985, E of San Antonio del Mar: Salina along estuary of Rio San Antonio, *R. F. Thorne 58811, D. Charlton* (NY); 20 April 1975, 4 miles SE of Santa María, *R. Moran 21785* (NY, SD); 9 April 1936, San Quintin, *C. Epling s.n., Wm. Stewart* (NY); 5 April 1936, San Quintin, *C. Epling s.n., Wm. Stewart* (ENCB); 15 March 1956, 4 miles east of El Rosario, *J. T. Howell 31018* (CAS, NY, SD); 2 March 1930, Flats 1 mile from ocean, 8 miles north of Hamilton Ranch (Santo Domingo), *I. L. Wiggins 4292* (CAS, NY, US); 2 April 1931, Coastal bluff 20 mi. So. of Tijuana, near Rancho Cuevas, *I. L. Wiggins 5117* (CAS, NY); 8 April 1931, Santa Maria Plains 10–20 mi. S. of Hamilton Ranch, *I. L. Wiggins 5201* (CAS, NY); 10 April 1931, 7 mi. N. of Rosario, *I. L. Wiggins 5238* (CAS, NY, US); 27 April 1978, NE of Ensenada, along Mex Hwy 3, 9.8 mi NE of jct with Mex. Hwy 1, *C. R. Broome, B. Ertter, C. Cagle 1932* (NY); 6 June 1972, Rte. 1, 20 mi S of Camalu, *D. Pinkava P9034, L. McGill, T. Nash* (NY); 30 May 1973, At km. post 120, 3½ mi. N. of Colonet, *R. & M. Spellenberg 3306* (ENCB, NY); 3 January 2000, El Consuelo, about 16 km (rd) west of El Rosario on Hwy 1; *M. Fishbein 4165, S. McMahon, K. Hooper, M. Hedin, M. Lowder* (NY); 27 June 1988, 9 miles North of El Rosario towards San Quintin, along Route 1, *T. S. Elias 10902, D. Arias, O. Dorado* (MEXU, NY); 5 April 1991, Arroyo Rosarito at crossing of Hwy 1, 47 mi north of Guerrero Negro, *S. Boyd 5971, T. Ross* (MEXU, NY); 19 March 1993, Approx. 86 km south of San Quintin along Hwy 1, *J. Rebman 1646, J. Delgadillo* (NY); II-1889, San Quentin Bay, Baja California, *E. Palmer 700* (NY, US); 3 March 1930, Santa Maria Plains and low hills adjacent, 23.5 miles south of Hamilton Ranch, *I. L. Wiggins 4307* (CAS, NY); 14 September 1929, Canyon and adjacent slopes, 15–20 miles east of Ensenada on road to Ojos Negros, *I. L. Wiggins, Guilliespie 4060* (NY); 12 September 1929, Small valley 32 km north of Ensenada, *Wiggins, Guilliespie 4000* (NY, SD); 29 December 1924, Coronado Islands, *M. E. Jones s.n.* (CAS, NY); 19 June 1971, 8 miles W of Rancho San Jose de San Telmo (Meling Ranch), foothills of Sierra San Pedro Martir, *I. L. Wiggins 21514* (CAS, ENCB); 13 March 1956, 5.3 miles north of Arroyo Seco, *J. T. Howell 30951* (CAS); 4 April 1958, 14 km northwest of Colonia Guerrero, *P. H. Raven, H. Lewis, H. Thompson 12191* (CAS); 18 April 1958, 8.5 km east of El Rosario, *P. H. Raven, M. Mathias, J. Turner 12440* (CAS); 7 April 1921, T he Gulf of California. Ensenada, Baja Calif, *I. M. Johsnton 3019* (CAS); 14 March 1964, Los Coronados, along foot trail on rocky slope near center of island, *E. R. Blakley 6442* (CAS, SD); 29 March 1938, Below Ensenada, *L. Rowntree s.n.* (CAS); 22 February1950, Ensenada, *L. S. Rose 50015*; 4 March 1979, at Penasco la Lobera, 10 km SSE of Erendira, *R. Moran 26560* (CAS, ENCB, SD); 24 February1949, South Todos Santos Island, *I. L. Wiggins 11984* (CAS, US); 8 April 1954, San Carlos Canyon, 1.2 miles below Agua Caliente, *I. L. Wiggins 13066* (CAS); 23 May 1941, In adobe soil on hillside 9.5 miles north of Ensenada on old road ro Tijuana, 128 m, *I. L. Wiggins 10065* (CAS, US); 17 June 1971, on S side of San Telmo Valley, 15 miles E of Mexican Highway 1., *I. L. Wiggins 21437* (CAS); 20 March 1949, South of Tia Juana, *J. H. Thomas 75* (CAS); 25 March 1945, near Laguna Maria, just south of Bahia San Quintin, *Bacigalupi 3071* (CAS); 15 March 1987, Arroyo Santo Tomas: Riparian woodland along Rio Santo Tomas, ca. 5 mi from Hwy 1 W along road to La Bocan, *R. F. Thorne 62171, A. Liston, O. Mistretta* (MEXU, NY); 1 June 1994, On coastal flats to the west of Mex. Rte. 1 between San Quintin and El Rosario; approx. 9 miles north of El Rosario, *J. P. Rebman 2759* (CAS, NY); 27 April 1963, 40–45 km S of Tecate along road to Ensenada, *H. S. Gentry 19966* (US); 10 March 1930, Santa Catarina Landing, *I. Wiggins 4429* (MEXU, TEX-LL, US); 25 March 1954, 6.2 miles n. of Colonia Gurrero. Roadside, *G. B, Ownbey 2059* (US); 25 July 1971, 10 km al S de Chapala, carretera al ARCO, *Giovannini 13* (ENCB); 31 December 1958, Parte Baja de la Sierra de San Pedro Martir, *J Villa 49* (ENCB). **SONORA:** *n.d.*, *not exact locality, A. C. V. Schott s.n.* (NY); 20 March 2000, Islas Los Coronados, Central part of South Island above military facility, *J. Rebman 6244, R. Sosa* (SD); 7 April 1994, Mesa San Antonio to the west of Colonet.*J. P. Rebman 2526* (SD); 16 October 1971, Occasional on roadside depression 1

mile N of Rancho Santa Gertrudis, *R. Moran 18673* (ENCB, SD); 19 March 1968, slope above hotel, NE portion of island, Isla del Sur; Los Coronados, *R. N. Philbrick b66-268* (SD); 14 September 1929, 15–20 miles east of Ensenada on road to Ojos Negros, *Wiggins 4060, Guillespie* (SD); 17 November 1983, 15 mi. SE of El Rosario., *R. F. Thorne 57734, W. Wisura* (SD); 20 January 2015, Arroyo Rama; Reserva Natural Valle Tranquilo, *J. Riley 212, N. Jensen, J. Campos, J. Simancas, E. Meyer, S. Still* (SD); 17 March 2015, Arroyo Escopeta, *J. Riley 333, J. Montiel* (SD); 2 May 1939, Hamilton Ranch, *F. F. Gander 7318* (SD); 20 April 1947, 10 miles S of San Quintin, *C. F. Harbison 41813* (SD); 29 May 1966, *R. Moran 13194* (SD); 11 April 1982, Near head of canyon, 2.0 km west of Angostura and 14 km northwest of San Vicente, *R. Moran 30401* (SD); 28 March 1982, West side of Mesa de Descanso east of Medio Camino, *R. Moran 30162* (SD); 9 May 1978, Sierra San Pedro Martir; Roadside 3 km WSW of El Socorro, *R. Moran 25788* (SD); 25 April 1976, South side of Arroyo Santo Tomas, *R. Moran 22872* (SD); 30 May 1966, Pine Canyon 4 miles southwest of San Vicente, *R. Moran 13238* (SD); 1 April 1961, East of crest of hills, Tecate, *M. Pitman 2077, P. Fischer, R. H. Hevly* (MEXU, SD); 5 March 1982, Punta Banda, southsoutheast of Tres Hermanas Campground, *Baurl, Dice 780, Vess, Wier* (SD); 12 May 1994, Ensenada, ridge northeast of San Miguel, *G. L. Webster 30926* (SD); 8 April 1950, Near San Telmo, *F. Wylie s.n.* (SD); 20 April 1948, Santo Tomas Valley, *F. Wylie s.n.* (SD); 21 March 2012, Along coast south of Erendira and north of Colonet; on a coastal mesa and adjacent upper slopes south of Arroyo Hediondo and on the north side of the dirt road to San Vicente, *J. Rebman 22898, S. Vanderplank, et al.* (SD); 8 February 2012, Between Arroyo El Socorro and Arroyo El Rosario. Half a kilometer north of N1 within arroyo, *J. Montiel 6, J. Riley* (SD); 31 March 1992, On dirt road from Colnett to San Antonio del Mar, *D. G. Kelch 1846* (SD); 8 February 2012, Near intersection of M1 and Arroyo, *J. Riley 3, J. Montiel* (SD); 23 February 2001, Venustiano Carranza 1:50,000 topographic map; 11R 05 93 350mE 33 70 000mN, Bahia Falsa, Los Volcanes, 10 km SW of Lazaro Cardenas, along road on south side of cinder cone, *M. Baker 13902* (SD); 22 January 1983, Northwest Coast, 7 miles west of Maneadero on road to Punta Banda, *B. A. Prigge 4236, L. Prigge* (SD).

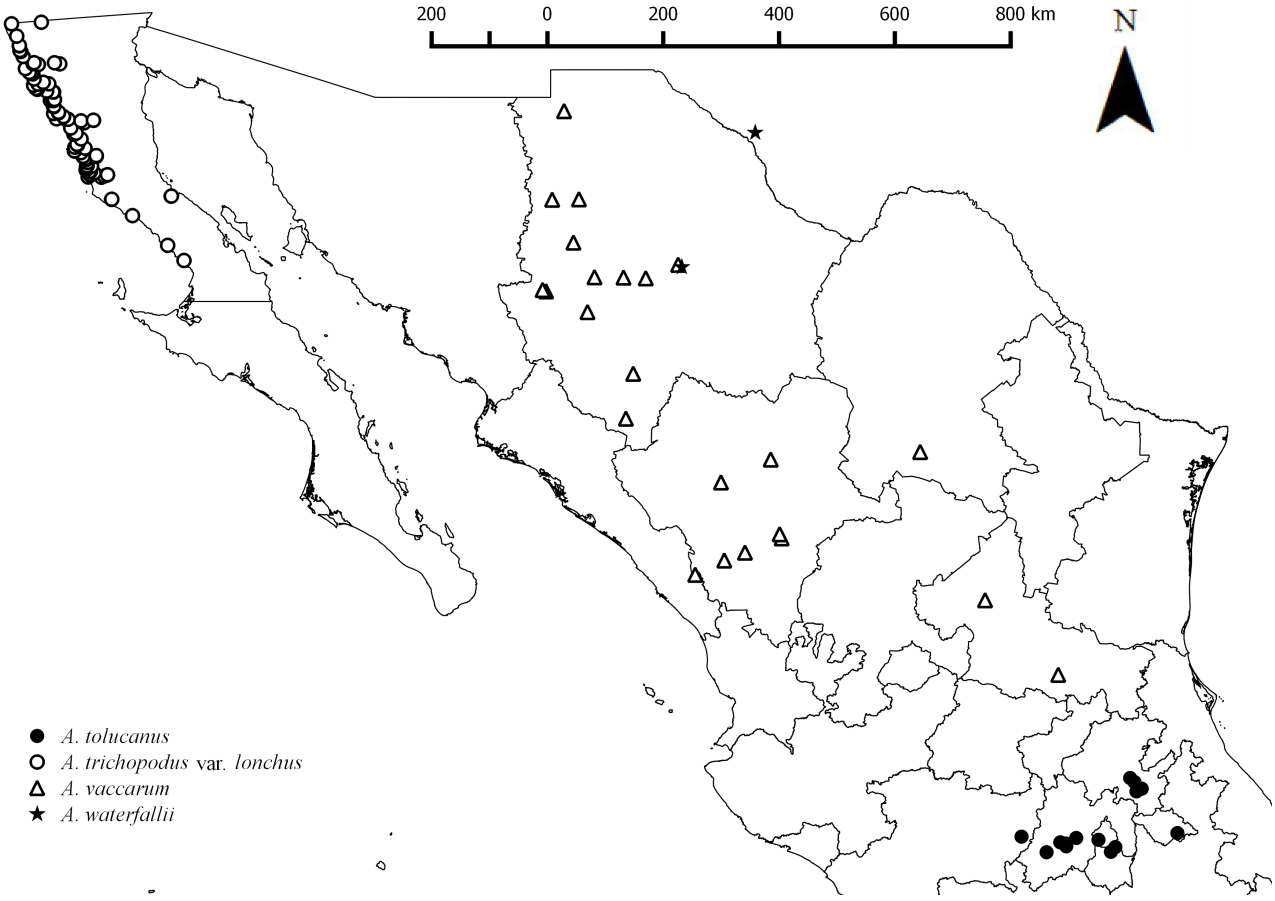

FIGURE 27. Map showing the distribution of *Astragalus tolucanus, A. trichopodus* var. *lonchus, A. vaccarum,* and *A. waterfallii* in Mexico.

99. ***Astragalus vaccarum*** A. Gray, Smithsonian Contr. Knowl. 5(6): 43. 1853

Type:—USA, New Mexico, Ojo de Vaca, west of the copper mines August 1851, *C. Wright 1002,* (holotype:, GH00059390 digital image!; isotype: US00001632 digital image!, NY00005760 digital image!, K000478285 digital image!).

Tragacantha vaccarum (A. Gray) Kuntze, Revis. Gen. Pl. 2: 949. 1891.—*Hamosa vaccarum* (A. Gray) Rydb., Bull. Torrey Bot. Club 54: 334. 1927.

Astragalus militaris M. E. Jones, Rev. N.-Amer. *Astragalus* 278. Pl. 70. 1923.—*Hamosa militaris* (M. E. Jones) Rydb., Bull. Torrey Bot. Club 54: 332. 1927.

Perennial. Stems up to 45 cm long, erect to diffuse, strigose, trichomes short, up to 1 mm long, straight, appressed o ascending. **Stipules** 2–8 mm long, free, lanceolate to deltoid. **Leaves** 4–12 cm long, leaflets 9–23, 2.6–24 mm long, linear, oblong to elliptic, acute to obtuse apically, short mucronate, adaxially glabrate or almost so. **Peduncles** 2–12 cm long, dense when young; the racemes 1.5–8 cm long, flowers 10–50, deflexed at maturity, at discontinuous intervals. **Flowers** purple or white with purple tones, sometimes soon ochroleucous, turning yellowish, the banner sometimes purple veined and the wing tips white; calyx 2.4–3.6 × 1.6–2.3 mm, strigose, trichomes white, black or both mixed, the tube 1.7–2.2 mm long, campanulate, the teeth 0.8–1.8 mm long, subulate; the banner 4.2–6.2 × 2–4 mm, ovate, basally narrow, widely or slightly retuse; wings 4.9–7 × 1.2–1.9 mm, the claw 1.6–2.6 mm long, the blade 3.4–4.8 mm long, oblong, elliptic to oblanceolate, apically oblique, thence incurved; the keel 3.7–5 × 1.6–2.1 mm, the claw 1.7–2.3 mm long, the blade 2–3.4 mm long, distally oblique, almost obovate. **Pod** 6–12 × 1.3–2 mm, sessile, triquetrous, linear, linear-oblong to elliptic, incurved, basally rounded, apically contracted in a straight to curved beak, somewhat compressed, ventrally carinate, dorsally sulcate, laterally almost straight, the angles rounded, the valves thin, light-green, minute strigose, trichomes white, sometimes mixed with black ones, turning papery to ochre with age, reticulate, septum narrow, incomplete; ovules 6–10; seeds 1.3–1.7 mm long, mitten shaped, purple-brown, smooth, somewhat shiny.

Distribution:—Endemic to northern Mexico, distributed mainly in the mountainous regions of northwestern Mexico, in the southern (Morelos, Guachochi, Guadalupe y Calvo), northwestern (Gómez Farías), southwestern (Ocampo, Huajumar, La Junta San Juanito, Uruachi, Bocoyna and Creel) Chihuahua; northern Durango (between La Zarca, Rancho Nuevo and Cruces, approximately 25°48'N–104°52'W), southern Sinaloa (Concordia), adjacent to the political border with southwestern Durango, one isolated locality in southern Coahuila (Parras) and another one in San Luis Potosí (Charcas) (Fig. 27).

Habitat:—Volcanic, clayey, sandy, gravelly, stony, red, yellow or light brown soils; grasslands; corn crops; pine-oak forest; oak forest; wet canyons; disturbed areas; thorny thickets with ocotillo, acacia, mezquite; oak thickets; disturbed pine-forest; also in pine, oak, manzanita associations; mixed forests with pine, cypress and oak; 1980–2480 m.

Comments:—Of at least 19 *Astragalus* species within the area of distribution for this species, only two species have triquetrous sessile pods and free stipules, *A. daleae* and *A. vaccarum.* Both of these species are very similar their morphology, except in their bracts (boat shaped in *A. daleae*) and the color of the petals (pale-yellow, white-greenish to ochroleucous in *A. daleae*).

Specimens examined:—CHIHUAHUA: 3 September 1994, Gómez Farías. Laguna de Babícora, Cerro Canoas, *E. Estrada 2928, T. Lebgue, G. Quintana* (NY); 20 August 1967, 39 mi. W. of Chihuahua on Rt. 16. *T. F. Stuessy 1022* (NY, TEX-LL); 26 July 1973, Bocoyna. W of Sizoguichic, along new road to Creek and Bocoyna, *R. A. Bye 4348* (NY); 3 August 1977, Along Hwy. 16, W of Chihuahua. 43.6 mi. W of General Trias, *Dunn 22589, Bennett, Torke, Wieder* (ENCB, NY); 15 August 1994, Gómez Farías. Laguna de Babícora, Cerro Las Jaras, *E. Estrada 3224, G. Quintana* (NY); 31 July 1988, Adolfo López Mateos. Chih. Hwy. 16, 34 km W of jxn. at La Junta, 35 km E of Tomochic, at the top of the first major ascent up Sierra Madre*, R. Spellenberg 9544, R. Corral, J. Brunt, L. Huenneke* (MEXU, NY); 2 August 1988, Chihuahua-Ocampo—9.6 km W of Huajumar on road to Ocampo, on road bank*, R. Spellenberg 9656* (MEXU, NY); IX-1851, Chihuahua, *G. Thurber 1051* (NY); 17 August 1984, Temosachic, *P. Tenorio 6543, C. Romero* (NY); 19 July 1975, 9 mi. W. of Cuauhtemoc along Hwy. 16, *Ellis 971, LeDoux, Watkins* (ENCB, MEXU, NY); 13 September 1987, Ocampo. 5.6 km of Huajumar on road to Ocampo, *R. Spellenberg 9377, D. Jewell* (NY, TEX-LL); 13 July 1986, 1 mi. W of Guadalupe y Calvo on road to Galeana, *R. Spellenberg 8561, J. Zimmerman* (NY); 15 July 1997, 2 mi NE of Zaragoza on Mexico Hwy 10, *D. Atwood 22908, J. Spencer* (NY, TEX-LL); 20 al 24 September 1899, Colonia Diaz, *E. W. Nelson 6448* (US); 14 August 1982, Guachochi—La Ranchería, 14 km. al E de Cabórachi*, R. Hernández M. 8943* (MEXU); 14 August 1982, Guachochi—La Ranchería, 14 km. al E de Cabórachi*, R. Hernández M. 8931,* (MEXU); 8 August 1982, Cabórachi, 20 km al este de Guachochi, *R. Hernández M 8500*

(MEXU). **COAHUILA:** 1–10 May 1880, San Lorenzo de Laguna, *E. Palmer 235* (NY); II October 1880, San Lorenzo de Laguna*, E. Palmer 235* (NY). **DURANGO:** 10 July 1984, 12 km, al S de El Casco. Carr. Durango, *P. Tenorio 6405, C. Romero* (MEXU, NY, US); 17 July 1982, Santiago Papasquiaro—Alrededores de Santiago Papasquiaro, *R. Henrández M. 7997* (CAS, MEXU). **SAN LUIS POTOSÍ:** 7 August 1934, Charcas, *C. L. Lundell 5148* (US); 26 May 1978, *C. Alcérreca 9* (MEXU); 5 August 1970, *A. Gómez s.n.* (MEXU). **SINALOA:** 1 September 1997, Sierra Madre Occidental; off Hwy 40 (Mazatlan-Durango Hwy) at Rancho Liebre, ca. 2 km. W of El Palmito; trail from highway to large barraca ca. 2 km NW, *A. C. Sanders 21205, F. M. Roberts, P. MacKay, T. Thomas, M. Egger, S. Eliason* (NY.

100. ***Astragalus waterfallii*** Barneby, Leafl. W. Bot. 7: 31. 1953

Type:—USA, New Mexico, Eddy County, 21 miles west of Artesia, 12 April 1953, *U. T. Waterfall 10615* (holotype: OKLA100018 digital image!; isotype: CAS0027730 digital image!, RSA0003147 digital image!, MO-149300 digital image!, US00001637 digital image!, GH00059397 digital image!).

Perennial. Stems short, up to 9 cm long, mainly acaulescent, pubescence dense, white, short stigose, the trichomes up to 0.7 mm long, straight, appresed. **Stipules** free to clasping, somewhat decurrent by a half or three quarters of stem´s circumference. **Leaves** 2–12 cm long, leaflets 9–25, 3–16 mm long, ovate, elliptic, ovate-oblong to oblanceolate, bicolored, brighter green and glabrous adaxially, abaxially dense pubescent. **Peduncles** 1.5–11 cm long, ascendant, soon deflexed and humistrate with age; the racemes 1.5–4 cm long, floweres 4–18. **Flowers** purple with white tones basally, the calyx 10–14 × 3.7–5 mm, tiny strigose, with white and black trichomes or both types mixed, the tube 8–11.5 mm long, cylindric, with purple tones, the teeth 1.3–4 mm long, subulate to triangular-subulate; the banner18–23 × 6–11 mm, ovate to oblanceolate, strongly curved; the wings 17–22.5 × 2.1–3.5 mm, the claw 8–11.4 mm long, the blade 10–12.8 mm long, lanceolar obovate; the keel 14.5–19 × 2.8–3.6 mm, the claw 7.5–10.9 mm, the blade 7.4–9.6 mm long, lanceolate-obovate, incurved. **Pod** 1.8–3.8 × 0.5–0.8 cm, sessile, humistrate but ascending, triquetrous or trigonous but little compressed laterally, incurved, oblong to oblong-elliptic or clavate-ellipsoid, gradually acute to the base, abruptly acute at apex, ending in a cuspidate small beak, ventrally carinate, lateral faces rounded, dorsally slightly sulcate, the valves leathery, fleshy to stiff-papery, brown to black-brown, finely reticulated and wrinkled, septum complete, the pod thence bilocular; ovules 28–38; seeds 2.2–3.2 mm long, mitten shaped, brown to light-brown, occassionally with purple spots, shiny.

Distribution:—Rare in Mexico, recorded and reported (Barneby, 1964) for northern Chihuahua (Sierra Rica, 1881, *Havard 31* (GH)), and Coahuila (Sierra de Parras, X-1910, *Purpus 4671* (UC)). Also, in New Mexico and Texas (USA) (Fig. 27).

Comments: Species easily identified by its short stems or even acaulescent ones.

Specimens examined:**—CHIHUAHUA:** (cited by Barneby, 1964, page 653, Map 83). Material not seen for Mexico. **TEXAS (very near to the Mexican border)**: 26 April 1961, Culberson, Just NE of San Antonio Peak, Sierra Tinaja Pinta, on upland plateau, *D. S. Correll & R. C. Rollins 23877*(TEX-LL); 27 March 1932, *E. Whitehouse 128d* (TEX-LL); 16 May 1959, Culberson, Head of pass in vicinity of roadside park, Guadalupe Canyon, *D. S. Correll & I. M. Johnston 21996* (TEX-LL); 28 Febraury 1957, Presidio, 25 mi. SW Marfa toward Shafter, *B. H. Warnock 14343* (TEX-LL).

101. ***Astragalus wootonii*** E. Sheld., Minn. Bot. Stud. 9: 138. 1894

Perennial. **Stems** up to 50 cm long, several, rarely single, decumbent to prostrate or incurved ascending, rarely erect, strigose to pilose, trichomes up to 0.8 mm long, straight, adpressed or ascending. **Stipules** 1.5–10.3 mm long, triangular, acuminate, clasping, not connate, embracing a half to three quarters of stem´s circumference. **Leaves** 1.5–13 cm long, leaflets 7–25, 3.2–21 mm long, linear, oblong, spathulate to obovate, apically obtuse, truncate or notched, sometimes mucronate, adaxially glabrate or almost so. **Peduncles** 1–7 cm long; the racemes lax, 0.5–5.3 cm long, flowers 2–15. **Flowers** whitish, sometimes purple, lavender with red-lilac tones; the calyx 4.2–6.5 × 1.8–2.5 mm, strigose, villous, trichomes white or almost all black, the tube 2–3.2 mm long, campanulate or somewhat turbinate, the teeth 2–3.5 mm long, subulate; the banner 4.6–7.5 × 3.1–6.2 mm, obovate to flabellate, recurved; the wings 4–7.4 × 1.1–2.2, the claw 1.4–2.7 mm long, the blade 2.5–5.6 mm long, oblong to obovate, distally oblique-obovate, incurved; the keel 4.1–6.4 × 1.5–2.4 mm, the claw 1.5–2.6 mm long, the blade 2.7–4.3 mm long, distally oblique, obovate and incurved. **Pod**

1–4.3 × 0.8–2.2 cm, extended, commonly humistrate, subglobose, ovoid, elliptic, oblique, ellipsoid, inflated like a bladder, basally rounded or narrowed, distally contracted in a small almost obsolete beak, almost spherical to slightly openly sulcate along the sutures, both equally convex or the dorsal one slightly more pronounced, the valves green or with purple tones, strigose, villous or glabrate, turning papery, ochre to light-brown with age, shiny, reticulate, septum absent; ovules 10–21; seeds 2–3 mm long, mitten shaped, brown, orange to purple-brown, opaque.

Distribution:—A species widely distributed in Mexico, from central Sonora and northern Chihuahua and Coahuila, through Durango, Zacatecas and San Luis Potosí, to the south, in the western Michoacán, central and western Puebla, to the west-central Veracruz, in close proximity to Puebla. One of the species with the largest distribution in Mexico, especially in semi-arid areas, entering the region of southern Mexico through the Valley of Mexico.

Comments:—At least 25 other species of *Astragalus* occur within the distribution of this species. Several of these species can be distinguished by their clasping stipules, simple pubescence, pink, purple or white, or when white, then purple, lavender or red-lilac tinted petals, and widened or inflated bladdery pods (*A. allochrous, A. lentiginosus* var. *borreganus*, *A. mollissimus* var. earlei, *A. m.* var. *irolanus*, *A. wootonii* var. *candollianus* and *A. w.* var. *wootonii*). *Astragalus mollissimus* (both varities) is distinguished by its calyx, the longestin any of these in this group (8.5–13 mm long); *A. wootonii* is distinguished from the others by its small petals (never larger than 7.5 mm long). In Sonora and Chihuahua, where *A. w.* var. *wootonii* and *A. allochrous* converge, they might be confused because sometimes the *A. allochrous* flowers may be small (banner 7.2–9.4 mm, wings 6.6–8.8 mm, the keel 6.2–7.5 mm) similar to the largest flowers of *A. wootonii*. However, they can be distinguished by the shape of the pod, since *A. allochrous* is oblique, semi-ovoid, its ventral suture is straight to slightly concave, less convex than the dorsal one and with a long developed beak that is easily distinguished from the body, and coupled with its pink to purple-red flowers (turning violet when drying).

Two varieties of *A. wootonii* are recognized, based on the type of pubescence and number of flowers per raceme (Barneby, 1964).

1. Pubescence of stems and leaves appressed, trichomes straight, 0.4–0.7 mm long; flowers 3–15 per raceme; Aguascalientes, Chihuahua, Sonora, Durango, Hidalgo, San Luis Potosí and Zacatecas ..... **var. *wootonii***
- Pubescence of stems and leaves villous to pilose, trichomes extended and incurved-ascending, 0.6–0.8 mm long; flowers 2–5 per raceme; Zacatecas, San Luis Potosí, Guanajuato, Hidalgo, State of Mexico, Puebla, and Veracruz ..... **var. *candollianus***

101.1. *Astragalus wootonii* E. Sheld. var. ***candollianus*** (Kunth) Barneby, Amer. Midl. Naturalist 41: 498. 1949

Type:—MEXICO, Jorullo, crescit in monte ignivomo Jorullo, 1803, *Humboldt & Bonpland s.n.* (holotype (based on *Phaca candolliana*): P00659959 digital image!; isotype: P00585026 digital image!).

Phaca candolliana Kunth, Nov. Gen. Sp. 6: 495–496. Pl. 586. 1823.—*Astragalus candollianus* Sheld. Minnesota Bot. Stud. 1: 140. 1893.—*Astragalus triflorus* (DC.) A. Gray var. *candollianus* (Kunth) M. E. Jones, Proc. Calif. Acad. Sci. ser. 2, 5: 637. 1895.—*Astragalus wootonii* E. Sheld. var. *candollianus* (Kunth) Barneby, Amer. Midl. Naturalist 41: 498. 1949.

Distribution:—This variety is endemic to the more southern parts of Mexico and has a wider distribution in Mexico. The northernmost limit is recorded in the valleys, plains and mountains of the Mexican Plateau from Zacatecas and San Luis Potosí, Michoacán, Hidalgo, Valley of Mexico to Veracruz (Fig. 28).

Habitat:—Volcanic, stony soils; crop areas; slopes of hills; overgrazed grasslands; desert scrublands with creosote bush, tarbush, joshua tree; degraded grasslands; desert grasslands; blue grama grassland; distrubed areas; stream banks; 1970–2500 m.

Specimens examined:—DURANGO: 5 May 1959, Abasolo, *E. Matuda 38529* (MEXU). **GUANAJUATO.** 21 February1990, Dolores Hidalgo Cuna de la Independencia Nacional—Llano de Abajo, carretera a Dolores Hidalgo, *E. Ventura V. 7742, E. López P.* (ENCB, IEB, MEXU); 2 May 1976, orilla oriental del Lago de Zumpangoorilla oriental del Lago de Zumpango, *Rzedowski 34119* (ENCB); 31 April 1964, Centro de Investigaciones Agrícolas del bajío, Mpio. Roque, *M. León G. s.n.* (ENCB). **HIDALGO:** 8 November 1975, Tepeapulco, *A. Ventura A. 527* (CAS, MEXU); 29 November 1975, San Luis, Mpio. Tepeapulco, *A. Ventura A. 632* (CAS, ENCB, MEXU); 14 June 1947, Epazoyucan, *H. E. Moore 3072* (US); 10 November 1974, Cerro Alto, 91 km al S de Epazoyucan|, Mpio. Epazoyucan, *J. Zarco 96* (ENCB, IBUG); 19 October 1977, Campo aledaños a la carr, fed. 138 km. 38 cerca de Tepetzingo, *F. J. Espinosa 365* (MEXU); 15 January 1977, 10 Km. al oeste de Pachuca, *W. Schwabe 77303* (MEXU); 13 October 1965, Ca. del Tecomate 2 Km al S del Km 7 Carr. Nal. 46 San Luis Potosi-Zacatecas, *F. Takaki 2127* (ENCB, MEXU); 16 December 1975, Tepeapulco, El Xihuingo, *A. Ventura A. 715* (MEXU); 27 September 1980, Epazoyucan, *A. Ventura A. 3702* (ENCB); 11 July 1967, Cerro Gordo, 7 km al W de Pachuca, *Rzedowski 23896* (ENCB); 13 July 1967, 20 km al E

de Ixmiquilpan, *L. González Q. 3747* (ENCB); 15 October 1978, 6 km al N de Tlanalapan, *R. Aguilar S. 43* (ENCB); 28 Spetember 1976, Cerro de Santa María Tecajete, Mpio. Zempoala, *A. Ventura A. 2190* (ENCB). **PUEBLA:** 8 December 1995, *T. Kajita, T. Yahara, A. Soejima 95120801* (MEXU); **SAN LUIS POTOSÍ:** 28 November 1985, Los Hernández, Mpio. Villa de Ramos, *F. Gómez L. 933* (ANSM); 7 September 1975, San Antonio, *N. Becerra s.n.* (ANSM); 18-III1-1962, Santo Domingo. El Socorro 11 km. al sur de Santo Domingo, *A. Gómez 748* (NY); 18-III1-1962, Santo Domingo. Herradura, *A. Gómez 749* (ENCB, NY); 11 March 1956, Ahualulco—Tulillo, *Rzedowski 7297* (CAS, ENCB, MEXU, TEX-LL); 15 March 1962, Salinas. Rancho Guadalupe, *A. Gómez G. 651* (NY); 19 February1963, Palma de la Cruz Soledad, *A. Gómez 828* (ENCB, NY); 24 December 1977, On route 49, just west of Salinas, *N. A. Harriman 14271, R, Janses* (NY); 18 March 1962, Santo Domingo. Herradura*, A. Gómez G. 749* (NY); 13 February1962, Entre El Agula y Villa de Arriaga, *A. Gómez G. 831* (NY); 28 March 1974, 12 mi E of San Luis Potosi at Km 244 (W of Cd. Valles), *P. A. Fryxell 2325* (ENCB, NY, TEX-LL); 25 August 1956, 2 km. al E de Laguna Seca, km. 20 carretera San Luis Potosí-Ant. Morelos, *Rzedowski 7997* (ENCB, MEXU); 5 May 1974, Km. 87, tramo Salinas—San Luis Potosí, *E. García M. 1011EGM* (MEXU); 2 March 1983, 1 km al S de la Escuela de Agronomía, Ejido Palma de la Cruz, Mpio. Soledad, *J. Ballin C. s.n.* (ENCB, MEXU); 15 March 1962, 1 km delante de La Parada, carretera central a Salinas, *A. Gómez 726* (ENCB); 5 May 1974, , Km. 87, tramo Salinas—San Luis Potosí, *E. García M. 1011-E.G.M.* (ENCB); 16 March 1962, Santo Domingo. Herradura, *A. Gómez 750* (ENCB); not date, 2 km adelante del Tecomate, carretera San Luis Potosí-Salinas, *A. Gómez 832* (ENCB); 21 November 1961, Ejido Laguna Seca, Mpio. Soledad Diez Gutiérrez, *A. Gómez 425* (ENCB). **STATE OF MEXICO:** 10 August 1977, Otumba. Campos agrícolas junto al entroque de los caminos a Cuautlacingo y Otumba*, F. J. Espinosa 231* (MEXU, NY); 10 October 1976, Ajapusco. Terrenos de Jaltepec, *A. Ventura 2274* (CAS, MEXU, NY); 10 October 1976, Terrenos de Jaltepec, Mpio. Ajapusco, *A. Ventura A. 2450* (CAS); 19 June 2001, Coatepec Harinas—Huayanalco, *N. Muñoz C. 74* (MEXU); 15 June 1976, Otumba, Ahuatepec, *A. Ventura A. 1598* (MEXU); 7 October 1975, Otumba, San Marcos*, A. Ventura A. 377* (ENCB); 7 October 1975, San Marcos, Mpio. Otumba, *A. Ventura A. 377* (ENCB); 14 August 1975, San Vicente, *A. Ventura A. 106* (ENCB). **VERACRUZ:** 12 November 1976, 2 Km. al NE de Totalco, Alchichica, *L. Rico 34, O. Téllez, R. Rogel* (CAS, MEXU); 24 August 1986, Perote. 4 km. (by air) NW of Frijol Colorado*, M. Nee 32953* (MEXU, NY, TEX-LL); 13 May 1968, Al SW del pueblo de Alchichica, *C. Ramos 157* (MEXU); 20 April 1967, 4 Km al NW de la Gloria, *F. G. Medrano 1621* (ENCB, MEXU); 7 May 1999, Perote—carretera Perote-Los Humern, *M. J. Lizama 1379* (MEXU). **ZACATECAS:** 8 November 1963, 2 miles e. of Sombrerete, *H. D. Ripley 13463, R. C. Barneby* (NY); 6 April 1970, 11 mi. E of Troncoso on Hwy 49, *Wm. F. Mahler 5755, J. W. Thieret* (NY); 17 June 1972, 10 km. WNW of Tecolotes, on road to Coapa, *M. C. Johnston 7891, F. Chiang, T. L. Wendt* (NY, MEXU, TEX-LL); 26 March 1973, 6 km. WSW of Tetillas, *M. C. Johnston 10421 &, 10423, T. L. Wendt, F. Chiang* (NY, MEXU, TEX-LL); 27 March 1973, 7 km airline NW of San Juan de Ulua (now called Primero de Mayo)*, M. C. Johnston 10430, T. L. Wendt, F. Chiang* (NY); 6 April 1961, 4 miles north of Los Alpes. Along Hwy 80, *R. L. McGregor 16643* (NY); 22/22 July 2004, Nopalera silvestre "La Gobernadora", Ejido Ojuelos, Mpio. Pinos, *L. A. García R. 730* (IBUG); 7/10 April 2005, Nopalera Silvestre "El Peñuelo, Mpio. El Sitios, *L. A. García R. 1083* (IBUG, MEXU); 16 ocotbeer 1965, Ca. del Tecomate 2.5 km al S del Km 78, Carretera nacional 46 San Luis Potosí-Zacatecas, Mpiop. Piunos, *F. Takaki 2127* (ENCB).

101.2. ***Astragalus wootonii*** E. Sheld. var. ***wootonii***

Type:—USA, New Mexico, near Las Cruces, May 1892, *E. O. Wooton s.n.* (holotype: not found; isotype: Dona Ana County, Organ Mountains, 15 May 1892, *Wooton s.n.* NY00005779!).

Phaca wootonii (E. Sheld.) Rydb., N. Amer. Fl. 24(6): 350. 1929.—*Astragalus wootonii* E. Sheld. var. *typicus* Barneby, Amer. Midl. Naturalist 41: 498. 1949.

Astragalus playanus M. E. Jones, Contr. W. Bot. 8: 6. 1898.—*Astragalus allochrous* A. Gray var. *playanus* (M.E. Jones) Isely, Syst. Bot. 8: 420 (1983).

Astragalus triflorus (DC.) A. Gray. var. *playanus* M. E. Jones, Rev. N.-Amer. *Astragalus* 106. 1923.—*Astragalus triflorus* (DC.) A.Gray, Smithsonian Contr. Knowl. 5(6): 45. 1853 (non *A. triflorus* (DC.) A. Gray, sens. stric., nec *Phaca triflora* DC.)).

*Phaca tracy*i Rydb., N. Amer. Fl. 24(6): 351. 1929; *Astragalus tracy*i (Rydb.) Cory, Rhodora 38: 406. 1936.

Distribution:—This variety is distributed mainly in northern Mexico, from central Sonora, in plains and hills from northwestern, eastern and southeastern Chihuahua, northwestern Coahuila to northwestern Durango. An isolated locality is found in southern San Luis Potosí (San Luis Potosí). Also, in California, Arizona, New Mexico, and Texas in USA (Fig. 28).

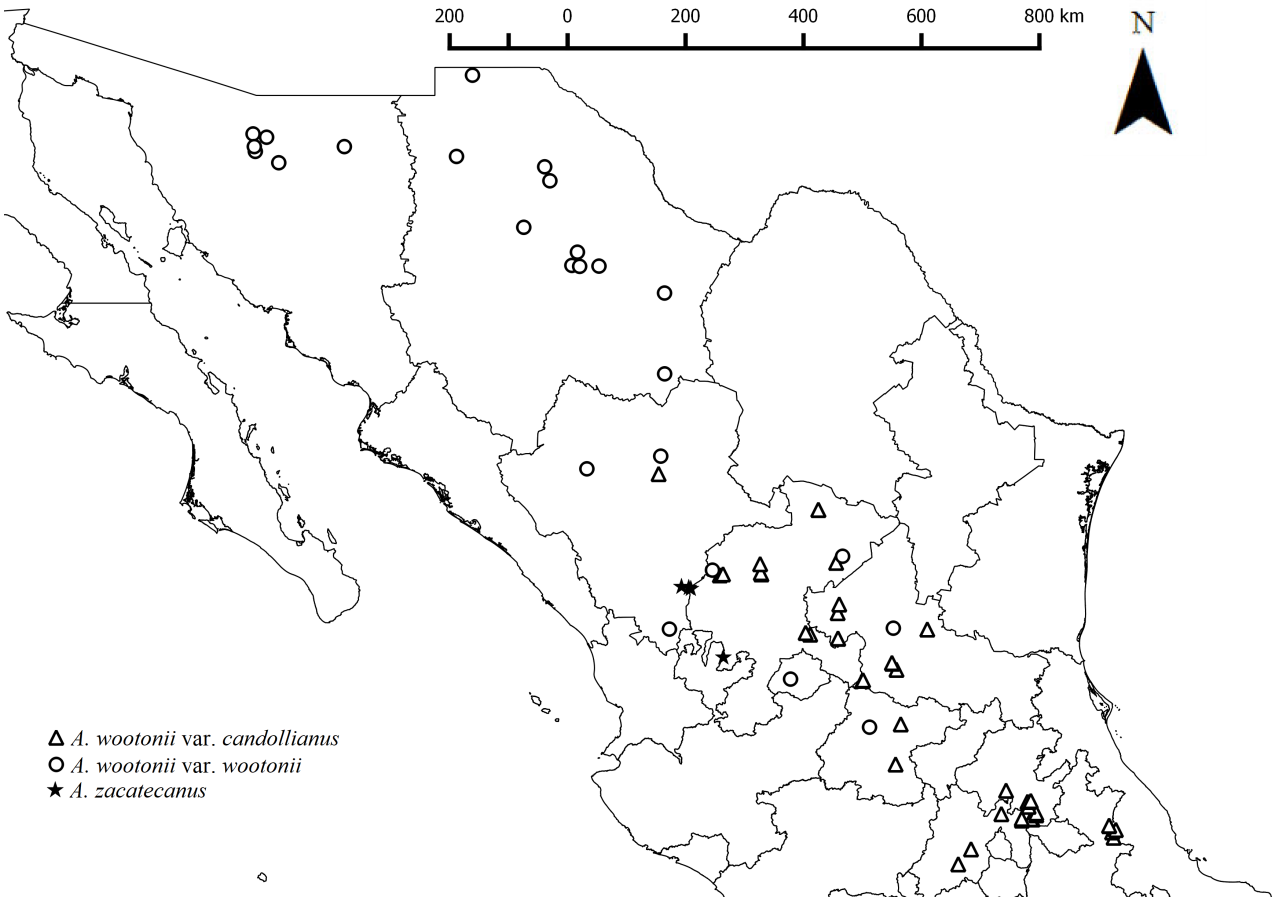

FIGURE 28. Map showing the distribution of *Astragalus wootonii* var. *wootonii, A. wootonii* var. *candollianus,* and *A. zacatecanus* in Mexico.

Habitat:—Alluvial plains; igneous reddish, sandy, gravelly, clayey, soils; creeks with mezquite; acacia and blue grama association; flooded areas with mezquite and sotol; acacia and creosote bush scrubland; desert grasslands associated with acacia and mezquite; scrubland-grassland with mezquite and ocotillo; roadside; 1450–2800 m.

Specimens examined:—AGUASCALIENTES: 20 March 1992, *A. Rodríguez A. 255* (IEB). **CHIHUAHUA:** 24 March 2006, Rancho Mesteñas, Mpio. Camargo, *J. A. Encina 1650, J. Encina, B. Gutiérrez B., E. Rocha M.* (ANSM); 28 March 2006, Carretera a Ojinaga, entre Rancho la Morita y Ejido Oasis, *J. A. Encina 2713, J. C. Díaz, J. A. Guillermo, J. C. Alcaya* (ANSM); 27 April 1979, Ejido Flores Magón, Mpio. Buenaventura, *F. Ibarra s.n., F. Gómez* (ANSM); 26 March 1973, 7 km airline NW. of San Juan de Ulua (now called Primero de Mayo), *M. C. Johnston 10423, T. L. Wendt, F. Chiang* (CAS, TEX-LL); 31 March 1973, Estacion Microondas "La Colorado", ca. 38 km. S. of Jimenez on highway to Torreon, *M. C. Johnston 10523, T. L. Wendt, F. Chiang* (CAS, MEXU, NY, TEX-LL); 2 April 1973, ½ km N of Casa Blanca; this is 45 km. N of the Camargo-Jimenez hwy on the La Perla road, *M. C. Johnston 10541, T. L. Wendt, F. Chiang* (MEXU, NY, TEX-LL); 24 March 1975, 2.2 mi E of Rancho Santa Rita on road to Hacienda Encinillas, W of Sierra Encinillas, *T. Wendt 777A, E. Lott* (MEXU, NY, TEX-LL); 4 May 1973, 1.5 km. W of Rancho Sta. Rita on the road to Las Mesteñas, *M. C. Johnston 10799, T. L. Wendt, F. Chiang* (CAS, MEXU, NY, TEX-LL); 9 May 1959, 3–5 miles south-east of Nueva Casas Grandes, *D. S. Correll 21670, I. M. Johnston* (NY, TEX-LL); 3 April 1997, *J. Spencer 9* (NY, TEX-LL); 30 March 1971, 37 mi S of Ahumada; on Mex. hwy 45, *37 mi S of Ahumada; on Mex. hwy 45, B. J. Cox 3316* (NY, TEX-LL); 15–17 May 1908, Vicinity of Aldama*, E. Palmer 246* (NY, US); 6 April 1886, Plains near Chihuahua,*C. G. Pringle 892* (CAS, NY, US); 8–27 April 1908, Vicinity of Chihuahua, *E. Palmer 43* (NY, US); 5 May 1901, Plains of Moctezuma, *C. G. Pringle 9441* (US); 31 March 1973, Estacion Microondas "La Colorado", ca. 38 km. S. of Jimenez on highway to Torreon, *M. C: Johnston et al., 10523* (MEXU); 6 April 1886, Plains near Chihuahua, *C. G. Pringle 892* (MEXU); 9 April 1898, Sandy plains near Lake Guzman, *C. G. Pringle 7544* (ENCB, MEXU); 20 June 1980, *B. Siqueiros 566* (MEXU); 6 May 1959, 12 miles E of Parral, *D. S. Correll 21535* (ENCB); 18 March 1975, *T. Wendt 687, E. Lot* (ENCB); 30 March 1971, *W. E. Harmon 5328, Cox* (ENCB). **DURANGO:** 4 April 1970, 8 mi N of El Casco on Hwy 45, *Wm. F. Mahler 5718, J.W. Thieret*

(NY); 25-III/16 April 1906, Collected at Tepehuanes, *E. Palmer 10* (NY, US); 6 February1985, Entre San Atenogenes y Narciso Mendoza, *S. González 3100* (ANSM, ENCB, IBUG, IEB, MEXU); IV-1978, Tepehuanes, *Ochoa-Martínez 277* (IEB, MEXU); April 1978, Tepehuanes, Mpio. Tepehuanes, *Ochoa-Mtz. 277* (IEB). **GUANAJUATO:** 31 April 1964, *M. León G. s.n.* (ENCB). **SAN LUIS POTOSÍ:** 1878, Chiefly in the region of San Luis Potosi, *C. C. Parry 173, E. Palmer* (NY, US). **SONORA**: 29 March 1970, 4.6 mi S of Cucurpe. Clif-face along San Miguel River and road, *L. A. McGill 6518* (NY); 21 April 1973, 13.5 mi. S. of Magdalena on road to Cucurpe, *R. & M. Spellenberg 3053* (NY); 28 December 1976, 1 mile s. of Santa Ana, *C. D. Johnson 223-76* (NY); 5 April 1932, 15 m. n. Magdalena, *F. R. Fosberg 7511* (CAS, NY); 29 March 1970, 4.6 mi S of Cucurpe. Clif-face along San Miguel River and road, *D. J. Pinkava 6518, L. McGill* (NY); 22 March 1971, 12 mmi. N. of Santa Ana along Highway 15, *R. & M. Spellenberg 2518* (ENCB, NY); 9 April 1939, So. of Santa Ana on road to Hermocillo, *T. C. Frye 2323, E.M. Frye* (CAS, NY); 14 April 1970, 4 mi NE of Magdalena on Hwy 15, *Wm. F. Mahler 6088, J.W. Thieret* (NY); 9 April 1939, South of Santana, on road to Hermosillo, *T. C. Frye 2323* (NY, US); 21 April 1973, 13.5 mi. S. of Magdalena on road to Cucurpe, *R. W. Spellenberg 3053* (NY). **ZACATECAS:** 27 March 1973, 7 km. airline NW. of San Juan de Ulua (Now called Primero de Mayo), *M. C. Johnston, F. Chiang, T. Wendt 10430* (CAS); 31 March 1982, Camino a San Francisco de Órganos, *M. González E. 342* (ENCB).

102. ***Astragalus zacatecanus*** (Rydb.) Barneby, Mem. N. Y. Bot. Gard. 13: 165. 1964

Type:—MEXICO, Zacatecas, SW of Zacatecas, near Monte Escobedo, 1897, *Rose 2638* (holotype: NY00006108!; isotype: US00001650 digital image!).

Atelophragma zacatecanum Rydb., Bull. Torrey Bot. Club 55: 157. 1928.

Perennial. Stems up to 100 cm long, ascendant, decumbent to erect, minute strigose, trichomes short, up to 0.5 mm long. **Stipules** 2–7 mm long, connate, triangular. **Leaves** 4–7.5 cm long, leaflets 9–17, 5–20 mm long, oblong to oblanceolate, apically obtuse or notched, adaxially scattered pubescent. **Peduncles** 7–13 cm long; the racemes (2.2–)9–18 cm long, flowers 10–58. **Flowers** green yellowish, cream to ochroleucous; the calyx 4.5–7 × 2.5–2.8 mm, strigose, trichomes white and black mixed, the tube 2–3.1 mm long, campanulate, the teeth 2–4.2 mm long, subulate; the banner 6.4–9 × 3.5–4.6 mm, obovate, basally narrowed, recurved; the wings 6.8–9 × 1.5 mm, the claw 3–4 mm long, the blade 5.6–6 mm long, oblong, distally oblique, obovate, thence incurved; the keel 6.2–7 × 2.1 mm, the claw 2.8–3 mm long, the blade 4–4.4 mm long, apically oblique, almost obovate, incurved. **Pod** 13–23 × 5–7 mm, deflexed, stipitate (stipe 2.8–3.1 mm long) lanceolate, oblong to elliptic, dorsoventrally flattened, straight, acute at both ends, distally ending in a triangular beak, dorsally wide sulcate, the valves thin, papery, glabrate, septum incomplete; ovules 18–24; seeds 1.2–1.9 mm long, mitten shaped, brown to dark brown, opaque.

Distribution:—Registered in Durango (Súchil and Vicente Guerrero) and southern Zacatecas (Monte Escobedo, 22°18'N–103°23'W), adjacent to northern Jalisco (Fig. 28).

Habitat:—Clayey and sandy soils; oak forest; pine forest; 2630 m.

Comments:—Both known localities are separated at about 160 km and at least five *Astragalus* species occur in this range, but only two, *A. jaliscensis* and *A. zacatecanus* have ochroleucous flowers and stipitate pods. *Astragalus jaliscensis* can be distinguished by its leaves with more leaflets (19–29), fewer flowers per raceme (12–25), longer petals (banner 10–15 mm, wings 10–10.5 mm, the keel 8.5 mm) and a longer pod (20–38 mm).

Specimens examined:—DURANGO: 14 August 1984, Súchil. San Juan de Michis, rumbo al Cerro "Chihuahuilla". *F. Chávez 53* (ANSM, MEXU, NY); 26 July 1990, SSW of Vicente Guerrero on road to Las Margaritas, on the Reserve de la Biosfera "La Michilia" on the mesic W slope of Sierra Urica on the old jeep road to Cerro de el Purgatorio, *R. Spellenberg 10354, S. González E.* (MEXU, NY); 15 July 1982, 14 km al W de Garame de Abajo *P. Tenorio L. 994, C. Romero de T.* (MEXU). **JALISCO:** 15 July 1982, Santiago Papasquiaro, Garame, 26 kms. al W de Santiago Papasquiaro, *R. Hernández M. 7900 et al.* (M.XU); **ZACATECAS:** 1898, Zacatecas, *J. N. Rose 2638* (NY).

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References

Amiri, M.S., Joharchi, M.R., Nadaf, M. & Nasseh, Y. (2020) Ethnobotanical knowledge of *Astragalus* spp.: The world's largest genus of vascular plants. *Avicenna Journal of Phytomedicine* 10 (2): 128–142.

Anderson, D.M.W. (1989) Evidence for the safety of gum tragacanth (Asiatic Astragalus spp.) and modern criteria for the evaluation of food additives. *Food additives and contaminants* 6 (1): 1–12. https://doi.org/10.1080/02652038909373733

Azani, N., Bruneau, A., Wojciechowski, M.F. & Zarre, S. (2017) Molecular phylogenetics of annual *Astragalus* (Fabaceae) and its systematic implications. *Botanical Journal of the Linnean Society* 184 (3): 347–365. https://doi.org/10.1093/botlinnean/box032

Barneby, R.C. (1953) Pugillus astragalorum XV: Four new species. *Leaflets of Western Botany* 7 (2): 31–38

Barneby, R.C. (1964) Atlas of North American *Astragalus*. *Memoirs of the New York Botanical Garden* 13: 1–1188. https://doi.org/10.1126/science.148.3671.833-a

Barneby, R.C. (1976) Dragma hippomanicum II. Astragali novi peninsulares Moraniani. *Brittonia* 28: 273–280. https://doi.org/10.2307/2805788

Barneby, R.C. (1982) Dragma Hippomanicum VIII. A new species of Astragalus section Strigulosi (Leguminosae) from Oaxaca. *Brittonia* 34: 78–80.

Barneby, R.C. (1989) *Intermountain Flora (Fabales)*. Vol. 3, Part B. The New York Botanical Garden, 279 pp. https://doi.org/10.2307/20179569

Bunge, A. (1868) Generis Astragali species gerontogeae. *Mémoires de l'Académie impériale des sciences de St. Pétersbourg* 11: 1–140.

Camazine, S. & Bye, R.A. (1980) A study of the medical ethnobotany of the Zuni Indians of New Mexico. *Journal of Ethnopharmacology* 2: 365–388. https://doi.org/10.1016/S0378-8741(80)81017-8

Cavanilles, A.J. (1791) *Astragalus garbancillo. Icones et Descriptiones Plantarum* 1: 59.

Chaudhary, L.B., Rana, T.S. & Anand, K.K. (2008) Current Status of the Systematics of Astragalus L. (Fabaceae) with Special Reference to the Himalayan Species in India. *Taiwania* 53 (4): 338–355.

Correll, D.S. & Johnston, M.C. (1970) *Manual of the Vascular Plants of Texas*. Texas Research Foundation, Renner, Texas, 1881 pp. https://doi.org/10.2307/1218891

Dexter, D.F., Martin, K. & Travis, L. (2014) Prehistoric Plant Use at Beaver Creek Rock Shelter, Southwestern Montana, USA. *Ethnobotany Research and Applications* 12: 355–384. https://doi.org/10.17348/era.12.0.355-384

de Candolle, A.P. (1802) *Astragalogia, nempe astragali, biser–rulae et oxytropidis: nec non phacae, colutae et lessertiae his–toria iconibus illustrate*. J.B. Garnery, Paris. https://doi.org/10.5962/bhl.title.517

Dasgupta, A. (2019) *Antiinflammatory Herbal Supplements*. *Translational Inflammation Perspectives in Translational Cell Biology*: 69–91. https://doi.org/10.1016/B978-0-12-813832-8.00004-2

Douglas, D. (1831) *Astragalus lentiginosus, Fl. Bor.-Amer.* (Hooker) 1 (3): 151.

Ebrahimzadeh, H., Niknam, V. & Maassoumi, A.A. (2000) Mucilage content and its sugar composition in *Astragalus* species from Iran. *Pakistan Journal of Botany* 32: 131–140.

Estrada, E., Villarreal, J.A. & Yen, M.C. (2005) *Astragalus mario–sousae* (Fabaceae: Galegeae) a new species from northeastern Mexico. *Brittonia* 57 (4): 314–319.
https://doi.org/10.1663/0007-196X(2005)057[0314:AMFGAN]2.0.CO;2

Estrada, E. & Villarreal, J.A. (2010) Flora del centro del estado de Chihuahua, México. *Acta Botanica Mexicana* 92: 51–118.
https://doi.org/10.21829/abm92.2010.283

Estrada, E., Delgado-Salinas, A. & Villarreal-Quintanilla, J.A. (2014) *Leguminosas de Nuevo León, México*. Universidad Nacional Autónoma de México, Instituto de Biología, México, 307 pp.

Estrada, E., González Elizondo, S. & Villarreal, J.A. (2016) A new species of *Astragalus* (Fabaceae, Faboideae) from Durango, Mexico. *Phytotaxa* 288 (1): 91–95.
https://doi.org/10.11646/phytotaxa.288.1.10

Estrada, E., Rebman, J.P. & Villarreal, J.A. (2019) *Astragalus comonduensis* and *Calliandra pilocarpa* (Fabaceae), two new species from Baja California Sur, Mexico. *Phytotaxa* 391 (1): 57–68.
https://doi.org/10.11646/phytotaxa.391.1.4

Estrada, A.E., Villarreal, J.A. & Encina, J.A. (2020) A new species and a new section of *Astragalus* (Fabaceae: Papilionoideae) from Mexico. *Phytotaxa* 428 (3): 163–172.
https://doi.org/10.11646/phytotaxa.428.3.1

Estrada, A.E., Villarreal, J.A. & Delgado-Salinas, A. (2022) Morphological range changes in Mexican *Astragalus radicans* Hornem. (Fabaceae: Galegeae): review of its taxonomy and nomenclature, *Phytotaxa* 470 (2): 123–132.
https://doi.org/10.11646/phytotaxa.470.2.1

Estrada, A.E., Rebman, J., González, C. & Villarreal, J.A. (2022) *Astragalus tijuanensis* and *Astragalus brauntonii* var. *lativexillum*, a new species and a new variety in the genus *Astragalus* (Fabaceae) from extreme northwestern Baja California, Mexico. *Phytotaxa* 577 (1): 1–13.
https://doi.org/10.11646/phytotaxa.577.1.1

Gómez–Sosa, E. (1979) Las especies Sudamericanas del genero *Astragalus* (Leguminosae) I. Las especies Patagónicas Argentinas. *Darwiniana* 22: 313–376.

Goncharov, N.F., Borisova, A.G., Gorshkova, S.G., Popov, M.G. & Vasilchenko, I.T. (1965) Leguminosae: *Astragalus*. *In*: Komarov, V.L. & Shishkin, B.K. (Eds.) *Flora of the US.S.R*., vol. 12. Israel Program for Scientific Translations, Jerusalem, Smithsonian Institution and the National Science Foundation, Washington, D.C., pp. 1–918.

Graham, D., Creamer, R., Cook, D., Welch, K.D., Pfister, J., Panter, K., Cibils, A., Ralphs, M., Encinias, M., McDaniel, K., Tompson, D. & Gardner, K. (2009) Solutions to locowed poisoning in New Mexico and western United States. *Rangelands* 31 (6): 3–8.
https://doi.org/10.2111/1551-501X-31.6.3

Gray, A. (1864) A revision and arrangement (mainly by the fruit) of the North American species of Astragalus and Oxytropis. *Proceedings of the American Academy of Arts and Sciences* 6: 188–236.

Gray, A. (1878) *Astragalus amphioxys* A. Gray. *Proceedings of the American Academy of Arts and Sciences* 13: 366–367.

Greene, E.L. (1885) *Astragalus anemophilus* Greene. *Bulletin of the Southern California Academy of Sciences* 1 (4): 186.

Greene, E.L. (1888) *Astragalus magdalenae* Greene, *Pittonia* 1: 162.
https://doi.org/10.1016/S0033-3506(88)80154-9

Henrickson, J. & Johnston, M.C. (1997) (prepublication) *A flora of the Chihuahuan Desert Region*. Published by J. Henrickson, Los Angeles, California, 1687 pp.

Isely, D. (1998) *Native and naturalized Leguminosae (Fabaceae) of the United States*. Brigham Young University Press, Provo, 1007 pp.

IUCN (2022) The IUCN Red List of Threatened Species. Version 2022–1. Available from: https://www.iucnredlist.org (accessed 15 August 2022)

Johnston, I.M. (1947) Astragalus in Argentina, Bolivia and Chile. *Journal of the Arnold Arboretum* 28: 336–409.
https://doi.org/10.5962/p.185581

Johnston, M.C. (1997) (prepublication) *A flora of the Chihuahuan Desert Region*. Published by J. Henrickson, Los Angeles, California. 1687 pp.

Jones, M.E. (1893) *Astragalus proriferus* M. E. Jones, *Zoe* 4: 275.

Jones, M.E. (1895) *Astragalus douglasii* var. *glaberrimus* M. E.Jones. *Proceedings of the California Academy of Sciences* ser. 2 (5): 645.

Jones, M.E. (1895) *Astragalus piscinus* M. E. Jones. *Proceedings of the California Academy of Sciences* ser. *2*. 5: 645.

Jones, M.E. (1898) *Astragalus americanus. Contributions to Western Botany* 8: 8.

Jones, M.E. (1898) *A. insularis* var. *quentinus* M.E. Jones. *Contributions to Western Botany* 8: 6.

Jones, N.E. (1912) *Astragalus pueblae* M. E. Jones. *Contributions to Western Botany* 14: 35.

https://doi.org/10.1093/nq/s11-V.107.35b
Jones, M.E. (1923) *Astragalus*. *Revision of North American Astragalus*. pp. 1–288. (distributed Feb.15) + Index to Plates and Plates 1–78 (distributed June 20).
Kazempour, O.S., Maassoumi, A.A. & Murakami, N. (2003) Molecular systematics of the genus *Astragalus* L. (Fabaceae): phylogenetic analyses of nuclear ribosomal DNA internal transcribed spacers and chloroplast gene ndhF sequences. *Plant Systematics and Evolution* 242: 1–32.
https://doi.org/10.1007/s00606-003-0014-1
Kazempour, O.S., Maassoumi, A.A. & Murakami, N. (2005). Molecular systematics of the Old world *Astragalus* (Fabaceae) as inferred from nrDNA ITS sequence data. *Brittonia* 57: 367–381.
https://doi.org/10.1663/0007-196X(2005)057[0367:MSOTOW]2.0.CO;2
Kellog, M.D. (1884) New species of Cedros Island Plants. *Bulletin of the Southern California Academy of Sciences* 1 (1): 6.
Lavin, M. & Marriott, H. (1997) *Astragalus molybdenus* s.l. (Leguminosae): Higher taxonomic relationships and identity of constituent species. *Systematic Botany* 22 (2): 199–217.
https://doi.org/10.2307/2419453
Lewis, G.P. & Schrire, B.D. (2003) *Leguminosae or Fabaceae? In*: Klitgaard, B. & Bruneau, A. (Eds.) *Advances in legume systematics, part 10, Higher level systematics*. Richmond, U.K. Royal Botanic Gardens, Kew, pp. 1–3.
Lewis, G., Schrire, B., Mackinder, B. & Lock, M. (2005) *Legumes of the world*. Royal Botanic Gardens, Kew, 577 pp.
https://doi.org/10.1017/S0960428606190198
Li, Q., Hu, J.H., Bo, G., Li, H.D., Song, S. & Yang, L.X. (2017) Advances on Immunoregulation Effect of *Astragalus* polysaccharides. *Chinese Journal of Experimental Traditional Medical Formulae* 2: 199–206.
Linnaeus, C. (1753) *Species plantarum*. Vol. 2. Impensis Laurentii Salvii, Holmiae, 639 pp.
Linnaeus, C. (1767) *Astrgalaus sinicus.* Mantissa Plantarum.
Liston, A. & Wheeler, J.A. (1994) The phylogenetic position of the genus *Astragalus* (Fabaceae): evidence from the chloro–plast genes rpoC1 and rpoC2. *Biochemical Systematics and Ecology* 22: 377–388.
https://doi.org/10.1016/0305-1978(94)90028-0
Liu, Z.G., Xiong, Z.M. & Yu, X.Y. (2003) Effect of *Astragalus* injection on immune function in patients with congestive heart failure. *Chinese Journal of Integrative Medicine* 23: 351–353.
Lnag-rang, X. & Podlech, D. (2010) *Astragalus* Linnaeus. *In*: Wu, Z.Y., Raven, P.H. & Hong, D.Y. (Eds.) *Flora of China* 10. Science Press, Beijing and Missouri Botanical Garden Press, St. Louis, U.S.A., pp. 328–453.
Lock, J.M. & Simpson, K. (1991) *Legumes of West Asia*: A Check–list. Royal Botanic Gardens, Kew.
Lock, M. & Schrire, B. (2005) Tribe Galegeae. *In*: Lewis, G., Schrire, B., Mackinder, B. & Lock, M. (Eds.) *Legumes of the world*. Royal Botanic Gardens, Kew, pp. 475–487.
Maassoumi, A.A. (1998) *Astragalus in the Old World*, Check List. Research Institute of Forests and Rangeland. Tehran, 617 pp.
Marin, R.E., Micheloud, J.F., Vignale, N.D., Gimeno, E.J., O'Toole, D., Gardner, D.R., Woods, L. & Uzal, F.A. (2020) Intoxication by *Astragalus garbancillo* var. *garbancillo* in llamas. *Journal of Veterinary Diagnostic Investigation:* 1–4.
https://doi.org/10.1177/1040638720914338
Marin, R.E., Gardner, D.R., Armien, A.G., Fortunato, R.H. & Uzal, F.E. (2022) Intoxication of llamas by *Astragalus punae* in Argentina. *Journal of Veterinary Diagnostic Investigation:* 1–5.
https://doi.org/10.1177/10406387221094272
McVaugh, R. (1987) *Flora Novo–Galiciana* Vol. 5. Leguminosae. The University of Michigan Press. Ann Arbor. Michigan, 786 pp.
Melgoza, A., Royo, M., Morales, C.R. & Sierra, J.S. (2003) Germinación de semillas de hierba loca (*Astragalus mollissimus* Torr) con diferentes niveles de humedad y temperatura. *Tec Pecu Mex* 41(1):85–89
Moench, C. (1794) *Astragalus membranaceus*, Methodus (Moench) 168.
Panter, K.E., Welch, K.D., Gardner, D.R., Lee, S.T., Green, B.T., Pfister, J.A., Cook, D., Davis, T.Z. & Stegelmeier, B.L. (2012) *Poisonous Plants of the United States*. *In*: Gupta, R.C. (Ed.) *Veterinary toxicology. Basic and clinical principles*. Cap. 61. Academic Press, pp. 837–889.
https://doi.org/10.1016/B978-0-12-811410-0.00061-1
Podlech, D. (1983) Zur taxonomie und nomenclatur de tragacanthoiden Astragali. *Mitt. Bot. Staatss. Munchen* 19: 1–23.
Pursh, F.T. (1813) *Astragalus racemosus. Flora Americae Septentrionalis* 2: 740.
Rebman, J., Gibson, J. & Rich, K. (2016) Annotated checklist of the vascular plants of Baja California, Mexico. Proc. *San Diego Society of Natural History* 45: 1–352.
Rydberg, P.A. (1929) Genera of North American Fabaceae VI. Astragalus and related genera. *American Journal of Botany* 16 (4): 197–206.
https://doi.org/10.1002/j.1537-2197.1929.tb09472.x

Rzedowski, J. & Rzedowski, G.C. (2015) Seis novedades de Leguminosae–Papilionoideae de México. *Acta Botanica Mexicana* 110: 1–19.
https://doi.org/10.21829/abm110.2015.192

Rzedowski, G.C. de & J. Rzedowski y colaboradores (2010) *Flora fanerogámica del Valle de México*. Instituto de Ecología, A. C., edición digital.

Sanderson, M.J. (1991) Phylogenetic relationships within North American *Astragalus* L. (Fabaceae). *Systematic Botany* 16: 414–430.
https://doi.org/10.2307/2419334

Sanderson, M.J. & Liston, A. (1995) Molecular phylogenetic systematics of Galegeae, with special reference to *Astragalus*. *In*: Crisp, M.D. & Doyle, J.J. (Eds.) *Advances in legume Systematics–phylogeny* 7. Royal Botanic Garden, Kew, India, pp. 331–350.

Sanderson & & Wojciechowski, M.F. (1996) Diversification rates in a temperate legume clade: are there so many species of *Astragalus* (Fabaceae)? *American Journal of Botany* 83: 1488–1502.
https://doi.org/10.1002/j.1537-2197.1996.tb13942.x

Semarnat Secretaría de Medio Ambiente y Recursos Naturales (2010) *Norma Oficial Mexicana NOM–059–SEMARNAT–2010*. Diario Oficial de la Federación (DOF), jueves 30 de diciembre de 2010.

Shahrajabian, M., Sun, W. & Cheng, Q. (2019) A review of *Astragalus* species as foodstuffs, dietary supplements, a traditional Chinese medicine and a part of modern pharmaceutical Science. *Applied Ecology and Environmental Research* 17 (6): 13371–13382.
https://doi.org/10.15666/aeer/1706_1337113382

Shreve, F. & Wiggins, I.L. (1964) *Vegetation and flora of the Sonoran Desert*. Stanford University Press, Stanford.

Sousa, S.M. & Delgado, A. (1998) *Leguminosas mexicanas: fitogeografía, endemismo y orígenes. In*: Ramamoorthy, T.P., Bye, R., Lot, A. & Fa, J. (Eds.) *Diversidad Biológica de México*. Instituto de Biología, Universidad Nacional Autónoma de México. México, D.F. pp. 449–500.

Spegazzini, C.L. (1902) *Astragalus nuttallianus* Speg., *Anales Mus. Nac. Buenos Aires* 7: 265.

Spellenberg, R., Lebgue, T. & Corral–Díaz, R. (1996) *A specimen–based, annotated checklist of the vascular plants of Parque Nacional "Cascada de Basaseachi" and adjacent areas, Chihuahua, Mexico*. Listados Florísticos de México, XIII. Instituto de Biología, Univ. Autónoma de México, Mexico.

Spellenberg, R., Van Devender, R.T. & Jenkins, P.D. (2014) *Astragalus martinii* (Fabaceae), a new species from eastern Sonora and western Chihuahua, Mexico. *Phytoneuron* 66: 1–8.

Spellenberg, R. & Anderson, E.W. (2019) *Astragalus pilosior* (Fabaceae), a new species from the Sierra Madre Occidental in Chihuahua, Mexico. *Journal of the Botanical Research Institute of Texas* 13 (1): 131–140.
https://doi.org/10.17348/jbrit.v13.i1.833

Taubert, P. (1894) *Leguminosae*. *In*: Engler, A. & Prantl, K. (Eds.) *Die Naturlichen Pflanzenfamilien*, vol. III. Verlag von W Engelmann, Leipzig, pp. 70–385.

Thiers, B. (2021) [continuously updated] Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available from: http://sweetgum.nybg.org/science/ih/ (accessed 21 June 2021)

Torrey, J. & Gray, A. (1838) Tribe Astragaleae. *Flora of North America* 1: 328–353.

Villarreal, J.A. (2001) *Listados florísticos de México* XXIII. Flora de Coahuila. Universidad Nacional Autónoma de México. Instituto de Biología. México, 136 pp.

Villarreal, J.A. & Carranza, M.A. (1994) Two new species of *Astragalus* (Leguminosae) from northeastern Mexico. *Brittonia* 46 (4): 335–339.
https://doi.org/10.1007/BF02819411

Wang, J., Jia, J., Song, L., Gong, X., Xu, J., Yang, M. & Li, M. (2019) Extraction, structure, and pharmacological activities of *Astragalus* polysaccharides. *Applied Sciences* 9. 122.
https://doi.org/10.3390/app9010122

Watson, S. (1882) *Astragalus giganteus*. *Proceedings of the American Academy of Arts and Sciences* 17: 370.

Watson, S. (1888) *Astragalus scalaris* S. Watson. *Proceedings of the American Academy of Arts and Sciences* 23: 270.

Whistler, R.L. (1993) *Exudate gums, in industrial gums*. Academic Press, pp. 309–339.
https://doi.org/10.1016/B978-0-08-092654-4.50016-4

Wiggins, I.L. (1980) *Flora of Baja California*. Stanford University Press. Stanford.

Williams, M.C. & Barneby, R.C. (1977) The occurrence of nitro-toxins in North American *Astragalus* (Fabaceae). *Brittonia* 29 (3): 310–331.
https://doi.org/10.2307/2806203

Wojciechowski, M.F., Sanderson, M.J., Baldwin, B.G. & Donoghue, M.J. (1993) Monophyly of aneuploid *Astragalus* (Fabaceae): evidence from nuclear ribosomal DNA internal transcribed spacer sequences. *American Journal of Botany* 80: 711–722.
https://doi.org/10.1002/j.1537-2197.1993.tb15241.x

Wojciechowski, M.F., Sanderson, M.J. & Hu, J. (1999) Evidence on the Monophyly of *Astragalus* (Fabaceae) and its Major Subgroups Based on Nuclear Ribosomal DNA ITS and Chloroplast DNA trnL Intron Data. *Systematic Botany* 24 (3): 409–437. https://doi.org/10.2307/2419698

Zarre, S. & Azani, N. (2013) Perspectives in taxonomy and phylogeny of the genus *Astragalus* (Fabaceae): a review. *Progress in Biological Science* 3: 1–6.